FOUNDRY TRADE JOURNAL
Established 1902
WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

Vol. 77 Thursday, December 27, 1945 No. 1532

Re-staffing Industry

Never do we remember any period in the history of this country when the labour shortage was so acute. Moreover, we do not see in the near future any real amelioration. The reservoir—that is, the men to be demobilised from the Services—and the redundant labour from the munition works, though large, is quite inadequate for the work in sight. The major factors, as we view the problem, are that mechanisation if extended to the limit might take care of the reduced working hours—proposed and existing—and the later starting age for entrants to industry. There are still to be envisaged the potential losses to industry through compulsory national service; a heavier rate of retirement due to the abnormal continuation in service of pensionable people during the war years; the increasing urge to emigrate on the part of youth; the return to domestic duties of the housewives; the repatriation of the prisoners of war, and the general desire of working-class parents to have their boys and girls enter the black-coated professions. These then all figure on the debit side of the man-power balance sheet. Concurrently with these conditions is the existence of the longest lists of unfulfilled orders industry has ever known, which are being augmented daily.

Manufacturing capacity is being increased by the transfer of Government-owned factories to private firms; the list so far published cites a potential demand of between 300,000 and 400,000 workers. Later there is the expectancy of the wholesale transfer to this country of some German factories. From the above it seems abundantly clear that the competition for labour will be particularly severe for several years at least. No reliance can be placed upon the ex-foundry workers returning from the Army to take up their former trade, and to our mind the only solution of the problem is to attract youths and young girls to our industry, and having attracted them, to make a serious effort to keep them. Thus, every organisation catering for the well-being of the industry should form recruitment and education committees, or, where they exist, examine their personnel to ensure that it includes a number of real "go-gettters." All the latest devices of modern publicity must be used—the radio, the cinema, school talks, and enlightened publications. This implies co-operation on a national scale, with strong and enthusiastic support from the foundry centres. Then, having caught our "fish," the really big noises of each concern must take as much interest in their welfare as they are wont to do in their biggest customer.

There must be a realisation that in this dynamic age it is easier to break down custom and to change an outlook than ever before. But a few years ago, German children regarded school as a place where they learnt to read and write; now it is a building to which they are sent to draw their bread and potato rations! Unintelligent propaganda has distorted the foundry as the least desirable place in which to earn a livelihood. This must be so changed that it is universally regarded as the cradle of all industries, and one which provides a varied and interesting career based on a proper appreciation and application of technology. Sir John Anderson in a recent speech said "universities, industrial firms and all other potential employers, including the Government, should make, and make known, their plans, indicating the types and numbers of trained men and women they require, the terms they offer and the kind of organisation they propose. Such information, properly collated, will be an indispensable basis for the work of the committee on scientific priorities, and will also provide the necessary material for an approach to headmasters and, through them, to parents."

AT A MEETING of the Institute of Traffic Administration, a resolution "urging the Government to release more newsprint, both for the technical and daily Press," was proposed by Sir Herbert Matthews and carried unanimously.

Contents

Restaffing Industry, 361.—An Improved Sand Rammer, 362.—Book Review, 362.—Electric Furnace Explosion, 362.—Vitreous Enamellers Meet in London, 362.—Residual Elements and Gas Contents of Cast Iron, 363.—Distribution of Industry Act, 1945, 370.—More Government Factories Allocated, 370.—A Review of the Major Changes in Grey-iron Foundry Practice during the Period 1914-44, 371.—Notes from the Branches, 377.—The Metal Patternmaker, 378.—British Cast Iron Research Association, 379.—Technical Information about German Industry, 380.—Experimental 4-ton Open-hearth, 380.—News in Brief, 382.

AN IMPROVED SAND RAMMER

PRODUCT OF EXTENSIVE RESEARCH

The Harry W. Dietert Company, of 9330, Roselawn Avenue, Detroit, 4, Michigan, U.S.A., announces an improved sand rammer built in accordance with American Foundrymen's Association specifications. This sand rammer incorporates improvements that were the result of extensive research to determine items that would aid sand technicians to obtain a precisely rammed sand specimen of 2 in. by 2 in. dimension, due to the further elimination of the personal equation and wear of the unit.

FIG. 1.—IMPROVED SAND RAMMER BUILT IN ACCORDANCE WITH A.F.A. SPECIFICATIONS.

In this sand rammer is incorporated the following improvements:—(1) Longer weight raising cam bearing; (2) take-up on weight raising cam bearing; (3) lever cam for conveniently and easily raising rammer-plunger-weight assembly during the loading and unloading cycle, ensuring a uniform impact between plunger and sand on loading; (4) greater strength in rammer support frame; (5) greater weight in rammer base; (6) modernistic design permits easier cleaning; (7) flowability indicator mounted on top of sand rammer to improve visibility of flowability dial, cleanliness of indicator, and the life of indicator by reducing shock; (8) flowability indicator automatically moves to inoperative position on raising plunger assembly, and (9) moisture indicator and flowability indicator are actuated by contact with flat end of plunger rod.

The sand rammer (Fig. 1) is equipped for rapid moisture determination and flowability determination.

BOOK REVIEW

"Deep Drawing and Pressing of Aluminium Alloys." Published by the Aluminium Development Association, Union Chambers, 63, Temple Row, Birmingham, 2. Price 1s.

The increasing demand for quantity output of shaped components in aluminium and aluminium alloys has given rise to considerable developments in mechanical mass-production methods. This bulletin (No. 10) could not have appeared at a more favourable moment. The bulletin deals specifically with power-press processes, and the tools necessary to produce standardised products economically. It opens with the preparation of the material describing blanking and shearing methods, blanking tool materials, their design and correct clearances, including methods adopted for piercing and perforating. Deep drawing methods take up 11 pages, commencing with a short description of the various types of presses recommended for this work. The properties of aluminium alloys affecting deep drawing are discussed, and general rules laid down. Tools, tool materials and lubricants are also dealt with, and a number of representative examples are illustrated and described, giving tables of die dimensions and number of draws required, together with other relevant information.

Press forming is treated similarly and comprehensively, with instructions of how to deal with springback and a means of calculating the relative formability of different alloys from their stress-strain curves. Included are various bending and flanging methods, such as forming shallow bends with rolls; forming sections by means of the press brake, and flanging by modern machine methods. The bulletin concludes with a chapter on coining and embossing, and an adequate select bibliography on the subject under discussion. The 40 pages are illustrated with 32 photographs and diagrams of typical machines, tools, and methods of production, together with a number of useful tables in amplification of the text.

ELECTRIC FURNACE EXPLOSION

Shortly after the war broke out, we warned furnace operators, in an editorial, to beware of cylindrical scrap, where the ends were closed. We did this from a personal experience of the last war. Now a fatal accident has been reported in the recently issued April-June number of the "Industrial Bulletin." This periodical now recommends:—(1) All firms supplying scrap for melting shall be instructed to exclude any hollow vessel or object which is completely closed or sealed, accidentally or otherwise, and (2) all casting-shop personnel shall be instructed not to accept material containing hollow articles if closed or sealed.

VITREOUS ENAMELLERS' LONDON MEETING

A meeting is to be held at the Charing Cross Hotel, London, W.C.2, at 7 p.m., on January 29, for the purpose of resuscitating the London section of the Institute of Vitreous Enamellers. Anyone interested in the technological aspects of this industry is cordially invited to attend.

RESIDUAL ELEMENTS AND GAS CONTENTS OF CAST IRON*

Dr. Hurst's address stresses the fundamental role played by small amounts of rare elements in the properties of alloys

By J. E. HURST, D.Met.

It is proposed to deal with this subject from the point of view and in such a manner as to form a continuation of last year's presidential address. Then, to illustrate the subject, the foundry problem of variation in character and/or quality of the castings produced in the foundry from apparently the same materials was discussed. As an example, details were given of a case of the continuous production of a certain type of casting in which, although the chemical composition as normally assessed showed no significant differences, epidemics of porosity on hydraulic test at irregular intervals caused considerable trouble.

Observation appeared to connect these epidemics with the characteristics of the pig-iron in the metal mixture, and investigation revealed a definite difference in microstructure between the sound and unsound types which appeared to correspond to a difference in the structural character of some of the pig-irons in the metal mixture. The search for some understanding of this sort of thing directs attention to the presence or absence of elements or constituents present in the cast iron other than those normally relied upon for control of the composition, and for the purposes of this address these are classified as residual elements and gas contents. In the case already mentioned it was possible to show a difference in hydrogen content in both the pig-irons and the castings.

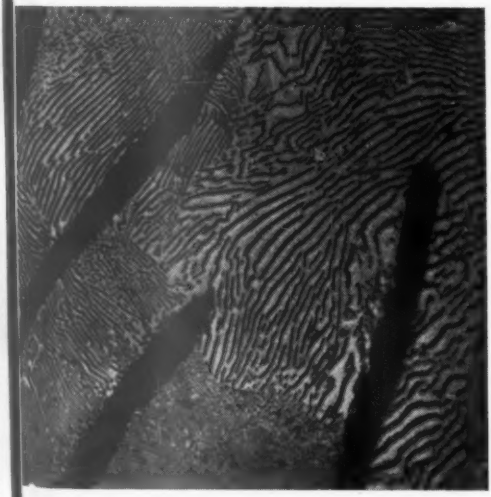


FIG. 1.—GREY IRON WITHOUT TELLURIUM ADDITION. × 600.

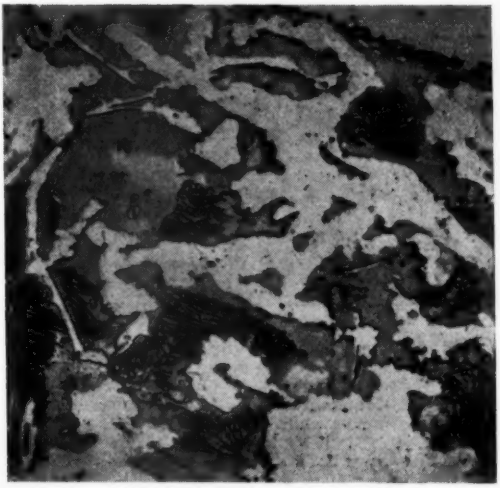


FIG. 2.—SAME IRON AS FIG. 1, BUT WITH 0.10 PER CENT. TE. × 600.

Effect of Residual or Trace Elements

It is, of course, well understood that small changes in chemical composition can be accompanied by very substantial changes in the characteristics of cast iron. It may be of interest to recall one or two examples of the profound influence exerted by comparatively small additions, almost traces of elements not normally considered in the routine control of the composition of iron for castings. One example can be drawn from the influence of aluminium. An addition of this element in proportions of the order of 0.10 per cent. or less in certain circumstances has a profound effect, causing an iron which might otherwise have a hard white or mottled fracture to solidify grey. The reverse effect results from the addition of small traces of the

*Presidential address to the Staffordshire Iron and Steel Institute.

Residual Elements and Gas Contents

elements boron and tellurium. The example illustrated by the microphotographs, Figs. 1 and 2, shows very clearly the influence of an addition of 0.10 per cent. of tellurium to an iron which, without tellurium, solidifies completely grey as in Fig. 1. The mere addition of

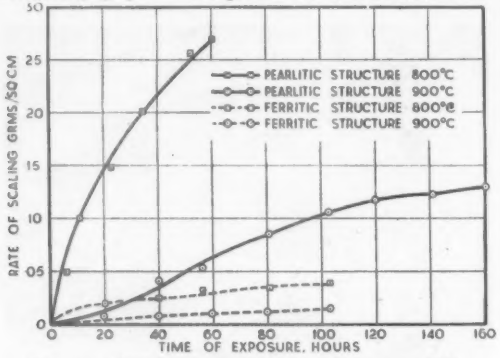


FIG. 3.—THE SCALING OF SILAL IN AIR AT 800 AND 900 DEG. C.

such a small quantity of this element has brought about the complete whitening of the structure as shown in Fig. 2.

The view can be taken that this is a matter of increasing importance, for with the large amounts of scrap and secondary materials made available by the war, many of which contain deliberate additions of some of the rarer elements, *e.g.*, boron steels, the risk of contamination in our various cast irons is increased greatly.

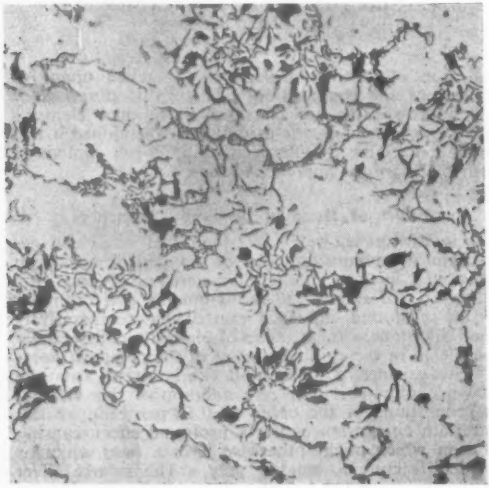


FIG. 4.—GOOD SILAL STRUCTURE. × 120.

FIG. 5.—BAD SILAL STRUCTURE. × 600.

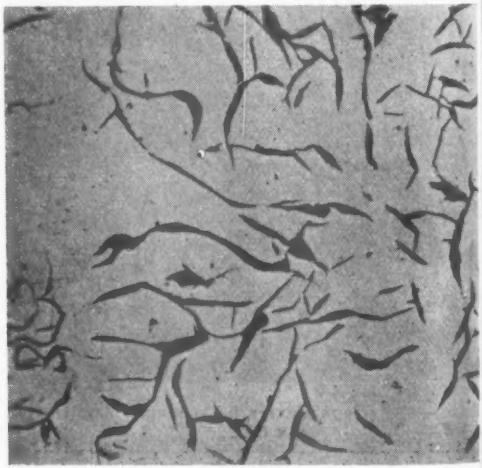


FIG. 6.—BAD NI-RESIST STRUCTURE. × 200.

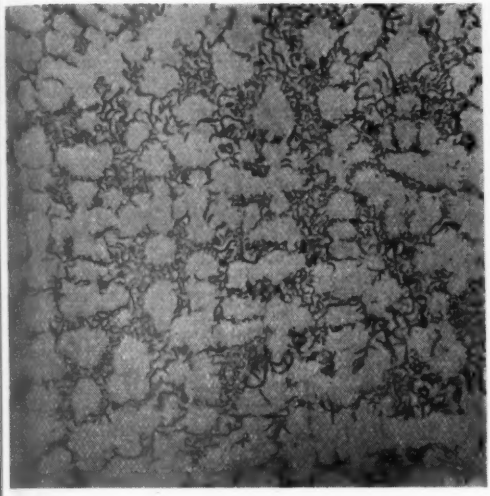


FIG. 7.—GOOD NI-RESIST STRUCTURE. × 200.

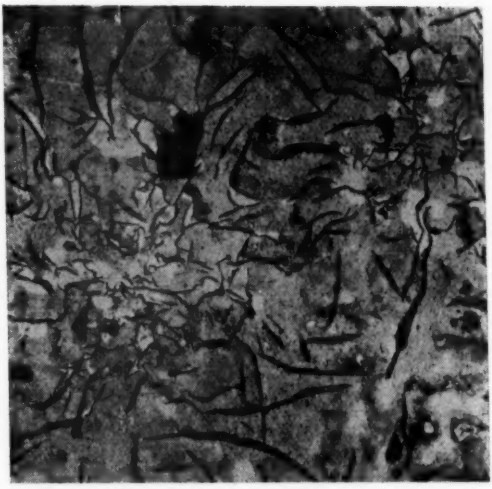


FIG. 8.—U.S.A. CYLINDER IRON. × 120.

Service Behaviour of Cast Irons

The chemical composition of cast iron as normally assessed is insufficient in itself to enable the prediction of its behaviour in service, and no doubt many from personal experience could quote examples where, in spite of the normal composition being identical, unexpected differences in service behaviour have arisen.

The high-silicon heat-resisting cast iron, Silal, developed by the British Cast Iron Research Association and containing approximately 6 per cent. of silicon, provides an excellent example of the type of case envisaged. In Fig. 3 the rate of scaling or oxidation is shown of two samples of approximately similar composition as normally assessed. In spite of the close similarity of composition the rate of scaling in one is vastly greater than the other. The better sample has a microstructure as illustrated in Fig. 4, consisting of fine graphite dispersed in a completely ferritic matrix quite different from the poor sample which, as shown in Fig. 5, has a coarse graphite structure, and a matrix not wholly ferritic but containing some pearlite. In the normal method of manufacturing this alloy in a direct arc furnace, the Author secures the correct structure for maximum scale resistance, that is, the fine graphite ferrite structure. But he does encounter strange variations in structure, which can be classified in three types:—(1) ferrite-fine graphite; (2) coarse graphite-pearlite, and (3) coarse graphite, pearlite and carbide or silicide. The results in Table I show a collection of routine analyses of a number of casts in which each of these three types of structure has been observed, and it will be clear that as far as they go these show nothing to indicate the cause of the structural differences recorded. Yet in every case the analyses and structural examination have been carried out on identically shaped specimens, *viz.*, the test-bars from the furnace heats.

A somewhat similar experience has been encountered with an austenitic cast iron of the Ni-Resist type as used in the manufacture of pumps, for pumping

TABLE I.—*Typical Compositions and Structures of Silal.*

C	Si	Mn	P	S	Ni	Cr	Cu	Type
2.09	5.40	0.49	0.27	0.064	0.34	0.12	0.14	Good I
2.14	5.11	0.48	0.26	0.070	0.20	0.06	0.13	,, I
2·20	5.76	0.46	0.22	0.060	—	—	—	Bad II
1.98	5.64	0.60	0.23	0.066	—	—	—	,, II
2.28	5.57	0.53	0.21	0.070	—	—	—	,, II
2.12	5.66	0.40	0.25	0.046	0.18	0.08	0.10	,, III
2.24	5.52	0.65	0.22	0.056	—	—	—	,, III

Residual Elements and Gas Contents

chemical liquor with crystals in suspension. These conditions involve corrosion and erosion, and in spite of the fact that the chemical compositions are practically

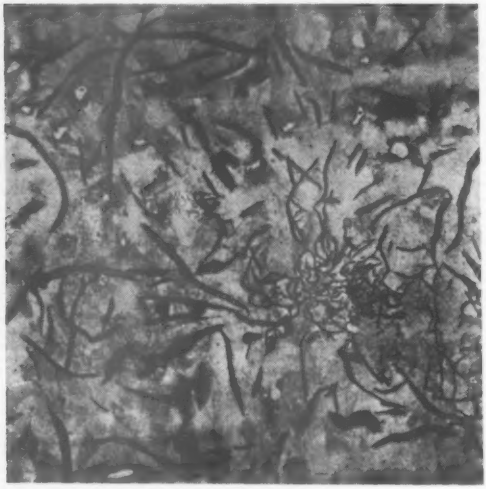


FIG. 9.—G.B. CYLINDER IRON. × 120.

identical as normally ascertained, the castings with the structure shown in Fig. 6, possessing coarse graphite, are completely unsatisfactory in behaviour when compared with the alloy having the fine graphite structure illustrated in Fig. 7.

Service Behaviour and Structural Character

Reliance is placed on these examples to demonstrate that cast irons similar in chemical analysis, so far as one normally takes the analysis, can show profound differences in service behaviour and in structural character. With the knowledge that the structural character can be modified very considerably by the presence of residual or trace elements, it will be clear that the understanding of such differences in behaviour or structure can never be complete without knowledge of the nature, character and amounts of such extraneous elements present. Even if it were possible, no attempt is made to provide an explanation of the differences in behaviour recorded, nor must it be assumed that in these cases the differences are due to residual elements and dissolved gases, information and data are not yet sufficient to say either one way or the other.

TABLE II.—*Composition of British and American Cylinder Irons.*

	British.	American.
C	3.36 per cent.	3.37 per cent.
Si	2.08 ,,	2.13 ,,
Mn	0.89 ,,	0.77 ,,
P	0.14 ,,	0.19 ,,
S	0.105 ,,	0.116 ,,
Ni	0.115 ,,	0.115 ,,
Cr	0.36 ,,	0.34 ,,
Mo	0.03 ,,	0.03 ,,
W	Absent	Absent
V	0.030 per cent.	0.03 per cent.
Ti	0.09 ,,	0.05 ,,
Co	Slight trace	Slight trace
Cu	0.130 per cent.	0.115 per cent.
Al	0.05 ,,	0.05 ,,
Z	Absent	Absent
Sn	,,	,,
Pb	,,	,,
Gases—		
O	0.0062 per cent.	0.0065 per cent.
H	3.3 ml. per 100 gms. metal	7.8 ml. per 100 gms. metal
N	0.0065 per cent.	0.0055 per cent.

The facilities at the disposal of the metallurgical laboratory to-day do ease the burden substantially in endeavouring to obtain full and accurate appreciation of the composition in such cases.

Examination of Cylinder Castings

For example, the results of an examination carried out in the Author's laboratory of two cylinder castings, one of British and the other of American origin, can be

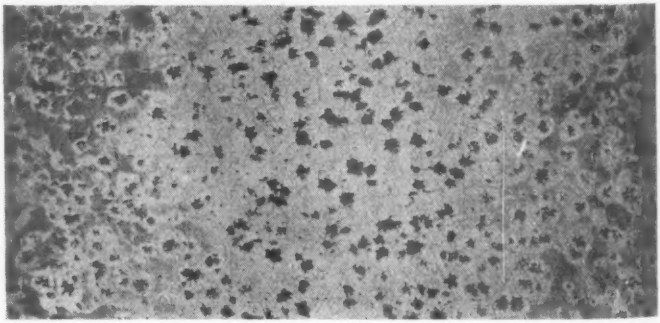


FIG. 10.—GOOD BLACKHEART MALLEABLE HAVING DULL BLACK FRACTURE. × 2

TABLE III.—*Complete Analysis of the Two Samples of Malleable Iron.*

	Sample A. Dull black desirable fracture.	Sample B. Bright crystalline fracture.
T. C	0.93 per cent.	0.89 per cent.
Si	0.38 ,,	0.40 ,,
Mn	0.31 ,,	0.36 ,,
P	0.086 ,,	0.086 ,,
S	0.100 ,,	0.110 ,,
Ni	0.01 ,,	0.01 ,,
Cr	0.02 ,,	0.02 ,,
Mo	0.01 ,,	0.01 ,,
V	0.01 ,,	0.01 ,,
Ti	0.04 ,,	0.02 ,,
Cu	0.02 ,,	0.02 ,,
Al	0.04 ,,	0.10 ,,
Te	Nil	Nil
B	,,	,,
Ca	0.005 per cent.	0.006 per cent.
Other metals	Absent	Absent
Gases—		
O	0.0050 per cent.	0.0062 per cent.
N	0.0070 ,,	0.0105 ,,
H	2.08 ml. per 100 gms.	2.26 ml. per 100 gms.

cited. The normal analyses of these castings showed them to be very similar. The two castings examined were almost exactly similar in this respect. Experience showed marked differences in machinability, and it was alleged that the behaviour in service from the point of view of wear resistance likewise differed. The photomicrographs, Figs. 8 and 9, show the American casting to contain a larger proportion of ferrite. The chemical compositions determined by chemical and spectrographic analysis are recorded in Table II, and significant percentages of additional elements are revealed. What might be quite an important difference revealed by these analyses is in the titanium content, which in the British is substantially higher than in the

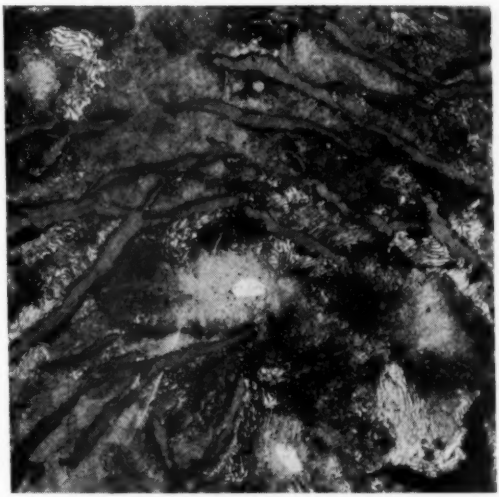


FIG. 12.—PRE-WAR QUALITY MARINE DIESEL ENGINE CYLINDER. × 120.

American casting. The results of the determination of the oxygen nitrogen and hydrogen contents of the vacuum fusion method are recorded also in Table II.

The content of oxygen and nitrogen is very similar in both castings, but in the case of the hydrogen the content of the American casting is over twice that of the British.

FIG. 11.—POOR-QUALITY BLACKHEART MALLEABLE HAVING BRIGHT CRYSTALLINE FRACTURE. × 22.

Blackheart Malleable Castings

A further example involves the results of the examination of two samples of blackheart malleable castings. One of these revealed a dull black fracture, and had a microstructure as shown in Fig. 10. The other, with a microstructure illustrated in Fig. 11, had a bright crystalline fracture. The chemical composition determined both chemically and spectrographically, together with the vacuum fusion results for oxygen, nitrogen and hydrogen are given in Table III.

Boron and tellurium, which have been returned as nil, means in this case that under the conditions of excitation no trace or

Residual Elements and Gas Contents

any boron lines occurred. As yet, metallurgists are not able to say that under other conditions of excitation traces would not be found. Also, although calcium has been found, personal experience leads to the belief that this is not in the alloy, but arises from calicum present in the apparatus.

The normally determined compositions of these two samples are for all practical purposes identical. Significant amounts of other elements were found to be present, and important differences were found only with the titanium, aluminium and nitrogen, the iron having the dull black fracture being the lower in aluminium, and nitrogen, and higher in titanium. The hydrogen contents showed little difference.

The analyses of two large marine Diesel engine cylinders (A) and (B) set out in Table IV have been included as an example of a deliberate attempt to duplicate a composition containing very small amounts of additional elements. Cylinder (A) represents the pre-war quality, the composition of which has been duplicated in cylinder (B). The structural character of the two cylinders is illustrated in the micrographs Figs. 12 and 13, showing the etched structure of (A) at magnifications of 120 and 600 respectively, and Figs. 14 and 15 the corresponding structures of cylinder (B).

The Author cannot, of course, offer an explanation of the differences in behaviour recorded in these various examples. They do show that with the resources available to-day metallurgists are able to explore more fully the composition of cast iron, and with some facility obtain reliable information as to the nature and amount of residual or trace elements and gases present. It will be obvious that it is necessary to accumulate much more data on which to build up an understanding of these incidents, but it will be equally obvious that in a case like the two British and American cylinder castings, no explanation of the difference in behaviour that does not take into account the difference in titanium and hydrogen content can be completely satisfactory. To those who might expect the ubiquitous hydrogen to provide an explanation for all these difficulties, the example of the two malleable castings will serve to keep their feet on the ground. It is worth mentioning that the hydrogen figures reported are the values for residual hydrogen in the specimens at the time they were examined. What relation this value has to the hydrogen content of the molten metal or at the time of solidification, if any, is not known. These are amongst the various aspects of this matter of residual elements and gas contents the Author is pursuing in his laboratories at present.

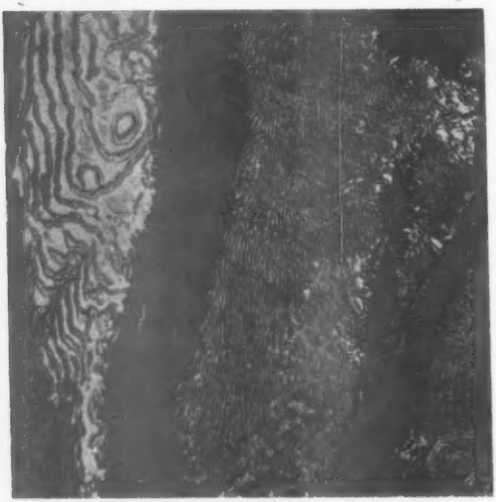


FIG. 13.—PRE-WAR QUALITY MARINE DIESEL ENGINE CYLINDER. × 600.

TABLE IV.—*Chemical Composition of Two Cylinder Irons.*

	Sample A. Tensile test-piece	Sample B. Piece of casting.	
T. C	2.94	2.92	Chemical determinations.
G. C	2.22	1.85	
C. C	0.72	1.07	
Si	0.71	0.97	Chemical and spectrograph determinations.
S	0.096	0.063	Chemical determinations.
P	0.37	0.47	
Mn	0.95	0.79	Spectrograph determinations.
Ni	0.06	0.17	
Cu	Trace	Trace	
Cr	0.09	0.12	Chemical checks.
Mo	Trace	Trace	
Ti	0.08	0.05	Spectrograph check.
V	0.16	0.17	Chemical determinations.

Soundness in Castings

Perhaps an example of experimental work in this field more closely related to production might prove specially interesting to those who view the previous work described as somewhat remote. For this reference is made to the production of castings in high-silicon acid-resisting iron. During the early part of May this year an abnormally high incidence of subcutaneous pinholing in castings occurred. In the investigation of this gas analyses were taken from the routine test samples representing the casts affected. These samples are in the form of ¼-in. dia. bars cast in dry-sand moulds. The results of these analyses in four individual cases are recorded in Table V. Last year it was found possible to state that the greatest

Residual Elements and Gas Contents

TABLE V.—*Gas Analyses from High-silicon Cast Iron Porous Castings. Samples taken from Dry Sand Test-bar.*

	(1)	(2)	(3)	(4)
O, per cent.	0.0022	0.0018	0.0025	0.0015
N, ,, ...	0.0026	0.0023	0.0014	0.0023
H, ml. per 100 gms.	2.70	2.35	2.95	2.55

Annealed Ingot, included in Melt.

	Annealed Ingot.	Casting Heat.
O, per cent.	0.0030	0.0050
N, ,, ...	0.0016	0.0029
H, ml. per 100 gms.	1.85	1.40

Random Samples during July. Annealed Ingot in Melt.

	(1)	(2)	(3)	(4)
O, per cent.	0.0050	0.0030	0.0016	0.0004
N, ,, ...	0.0029	0.0036	0.0024	0.0049
H, ml. per 100 gms.	1.40	1.34	2.32	1.44

single trouble in the production of sound castings arises from the gas content, principally hydrogen, and that if this gas is in excess of 2 mls. per 100 grams unsoundness invariably occurs. It will be observed that in all the cases examined the hydrogen content is well above this limiting figure. The remelted ingots during this period showed an equally high hydrogen content of 2.8 to 3.0 mls. per 100 grams.

It was, therefore, decided to submit the remelted ingots to annealing treatment to reduce the hydrogen content. The results obtained after this treatment are shown in the table and show a reduction in hydrogen to 1.85 mls. per 100 grams, and a completely satisfactory casting heat utilising this annealed ingot having a hydrogen content of 1.40 mls. per 100 grams. To complete the story a few random samples from casts during July are included, and show with one exception the hydrogen content below the critical value, and complete freedom from troubles due to unsoundness in the form of pinholes and blowholes. It is hoped that in this example will be found a demonstration of the real importance and value of work and development in this field of residual elements and dissolved gases.

Finally, the Author is conscious of having dealt with the subject matter as indicated by the title given to this address in such a manner as to leave many questions unanswered. This is inevitable in the present state of our knowledge.

IN THE COURSE of an article on "Graphite Moulds for Short-run Castings, John Putchinski, writing in a recent issue of the "Iron Age," states that in view of the better controls being introduced and more complicated shapes being cast centrifugally, the use of graphite moulds shows considerable promise. Graphite inserts may eliminate machining operations such as hole-boring, and undercuts and irregular contours, he thinks, will eventually be cast rather than machined.

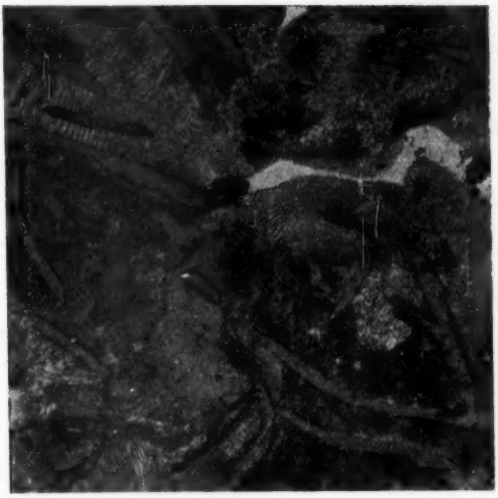


FIG. 14.—SUBSTITUTE MARINE DIESEL ENGINE CYLINDER. × 120.

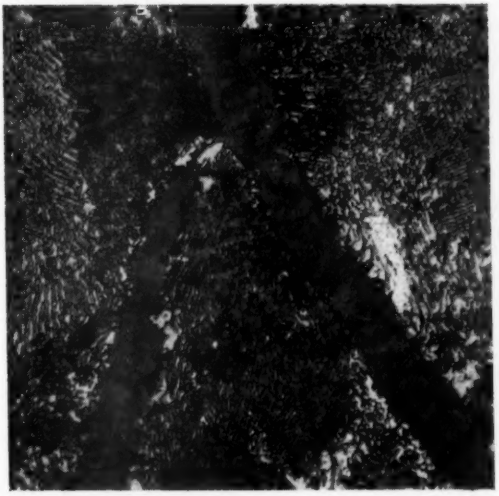


FIG. 15.—SUBSTITUTE MARINE DIESEL ENGINE CYLINDER. × 600.

DISTRIBUTION OF INDUSTRY ACT, 1945

BOARD OF TRADE'S POWERS

By F. J. TEBBUTT

Under the Distribution of Industry Act, 1945, the Board of Trade has power to acquire land for the provision of factories either by the Board or other persons, or loans for the same purpose can be made to trading or industrial estate companies (these being non-profit making companies formed to provide industrial premises for use by other persons, not by the particular company). Derelict land can be acquired by the Board, and it should be noted that the term "land" in law ordinarily includes premises. The Board can make fit for use or grants can be made to a local authority or a non-profit making company for a similar purpose; this provision will allow the land to be cleared of unsightly objects left over from former enterprises, pit heaps, etc., removed and so forth, giving more encouragement to an industrialist to consider such land for a new undertaking.

Grants or loans can be made towards improving a "basic service" (meaning facilities for transport, power, lighting or heating, etc.) which would enable such a service to be brought up to modern levels without increasing local rate poundage—a big item when a person is considering districts for starting industrial operations. Suppose an undertaking (whether already existing or to be formed) can show that it has good prospects of ultimately operating successfully but requires capital currently, financial assistance may be obtained from the Treasury. The foregoing matters only apply to development areas, which, however, cover a population of about six millions, these being scheduled in the Act. If, however, there seems a special danger of unemployment at any time, additional areas can be added by the Board of Trade just by an Order (such an Order must be approved by both Houses of Parliament).

Important Points

Any person intending to erect a new industrial building must notify the Board of Trade at least 60 days before the contract is placed or building started, and certain particulars must be supplied to the Board likewise (*e.g.*, location; trade; floor space; number of employees), that is, if the building is to have a floor space exceeding 10,000 sq. ft. This provision applies in respect of any area over Great Britain, and not just to the scheduled areas mentioned earlier. If the new building is contiguous or adjacent to another building of the same concern (erected before June 15, 1945) or it replaces another such building on the same site or one adjacent or contiguous to that site, these notification provisions do not apply.

Building Regulations

The notification provisions are obligatory under penalties, but the Board has no power under this Act to prohibit the building after 60 days have elapsed (of course, if the Board agrees, operations may be started earlier), but the snag at present is that there are building regulations. By these a building licence is required so there is power of prohibition, if not under the Act; it may be added, however, that the regulations are wartime measures, while the Act is permanent legislation. When the measure was going through Parliament, however, Government spokesmen emphasised that the real reason for the provision was to secure consultation between the Board and the person concerned, and in pursuance of the objects of the Act—the distribution of industry, etc.—it also being claimed that the Board can impart important information on such matters as public services in any district, lighting, power, water, transport, and so forth, with particulars of the labour available and whether suitable for the trade in question.

MORE GOVERNMENT FACTORIES ALLOCATED

LATEST RELEASES

An additional 29 Government factories have recently been allocated by the Board of Trade to various firms for civilian production. They represent an area of over 7 million sq. ft., and will give employment eventually to about 35,000 people. These allocations, like those previously announced, provide for a number of firms with good and important export connections as well as for manufacturers of urgently required consumer goods, including parts and equipment needed for the housing programme.

Up to date, 170 Government factories with an area of 44 million sq. ft., and estimated to provide employment for between 300,000 and 400,000 people, have been allocated by the Board of Trade to private industry or for use by the Government as training centres or disposals depots.

Nearly all the larger Government factories have now been allocated, and the space so dealt with amounts to more than three-fifths of the total expected to become available. The latest releases include the following:—

Keighley, Yorks, John Lund, Limited, boring machinery.

Sutton-in-Ashfield, Sheepbridge Stokes Centrifugal Castings Company, Limited, engine parts.

Worksop, George Turton Platts & Company, Limited, electric rail spikes.

Barking, Henry Browne & Son, Limited, aeronautical and marine instruments.

Newent, Charlesworth Bodies, Limited, kitchen units for prefabricated houses.

Castle Bromwich, Fisher & Ludlow, Limited, general engineering; motor bodies, household appliances.

Newton-le-Willows, Vulcan Foundry, Limited, locomotives.

Rutherglen, Riverside Engineering Company, Limited, colliery machinery.

A. E. SOUTHGATE, LIMITED, manufacturers of washers, have removed from 39, Vyse Street, Birmingham, 18, to River Street, Birmingham, 5.

A REVIEW OF THE MAJOR CHANGES IN GREY-IRON FOUNDRY PRACTICE DURING THE PERIOD 1914-1944*

Concentration of effort by metallurgists and foundrymen required in the future

By A. E. McRAE SMITH

This is not intended to be a general review of the ironfoundry trade during the period 1914-1944, but rather a *résumé* to stress the more important trends of theory and practice which have exerted a major influence in establishing the properties and qualities of grey-iron castings on the present high level. A very brief study of technical literature during this period shows that the metallurgical side of the grey cast-iron industry has shown much greater progress, with a few notable exceptions, than has been the case with casting technique, the ultimate object of which is to produce iron castings true to shape and completely sound and free from all blemish. If the industry is to continue to prosper and to hold its own with other metals and alloys, both cast and wrought, the two aspects of foundry practice must progress at equal rates.

About the year 1914 very little grey cast iron of any kind was being made in this country with a tensile strength much in excess of 14 tons per sq. in. and, even in the case of foundries specialising in the production of castings for the engineering trade, a tensile strength of 9 to 12 tons per sq. in. was usually acceptable during the early part of the period under review. This state of affairs has gradually and progressively improved, and it is now not unusual for foundries to be called upon to produce true grey-iron castings with a minimum tensile strength of 25 or 30 tons per sq. in. All this, of course, really only applies to engineers' castings, because properties other than strength are more important in castings for such applications as stove-plate, rainwater goods, builders' castings, etc.

Development of Foundry Technique

Now if there is to be a real demand for iron castings with high mechanical properties, but which also retain the additional and special qualities exhibited only by so-called soft grades of cast iron, it is essential that foundry technique be so developed that all castings passing the most rigid acceptance and inspection tests will be of uniform quality for any particular grade and, in addition, be free from all internal defects. Any type of high-strength cast material is useless if it is unreliable. Cast iron has been rejected for many applications in favour of materials not quite so suitable, solely on account of its unreliability. In order to cure this, the outlook should be so to improve the technique of handling any grade of molten cast iron after it leaves the furnace and is introduced into the mould, that the resulting casting will be sound and free from internal voids and other defects throughout its whole mass with a minimum of variation in structure and properties due to section gradient, no matter how complicated the design may be.

This can only be achieved by paying the greatest possible attention to designs of gating systems and self-feeding methods to provide molten metal to make up for the precise degree of liquid shrinkage exhibited by the type of cast iron being produced. The same care must be taken to devise suitable technique for the promotion of progressive solidification, etc. It is in this connection that the statement has already been made that purely metallurgical progress has, on the whole, been considerably in advance of the practical foundry side of the trade in the production of sound, reliable and uniform castings.

Consideration of Immediate Aims

A brief survey of the general tendencies which have brought about this greater improvement on the metallurgical side may be of some interest, more particularly with a view to consideration of what the immediate aims should be, having regard to the post-war period which will undoubtedly bring with it many new problems for the ironfoundry industry.

When one considers that in 1914 the only general specification for cast iron called for a minimum tensile strength of 9 tons per sq. in. and that this was practically the only grade, apart from a few more or less private specifications, *e.g.*, those issued by the railway companies, one can readily see how far the industry has travelled. Of course, it must not be thought that all the grey-iron castings produced prior to 1914 were weak and unreliable, because that was not the case, but the lack of any general specification other than the above does tend to prove that engineers and designers at that time did not expect anything better from grey-iron castings. It is rather remarkable that the first general specification for cast iron published by the British Standards Institution did not appear until February, 1928. This has now been somewhat modified under B.S.S. 321, 1938, but, apart from differences in the size of the test-bars specified, the physical properties are much the same, namely, a minimum tensile strength of 9 tons per sq. in. for Grade C and 11 tons per sq. in. for Grade A, measured on bars cast 1.2 in. dia.

At the same time as the 1938 revision a specification for high-duty cast iron was introduced, numbered B.S.S. 786. This calls for three grades of so-called

*Paper read before the Bristol and West of England branch of the Institute of British Foundrymen.

A Review of the Major Changes

high-duty cast iron, only one of which really comes within that category, namely, Grade 3 calling for a minimum tensile strength of 20 tons per sq. in. on 1.2 in. dia. test-bars. In May, 1941, an emergency specification covering a fourth grade was added to the above, which calls for a minimum tensile strength of 23 tons per sq. in. as measured on 1.2-in. bars. Therefore it is rather astounding to find that, during the period 1928 to 1941, the minimum tensile properties required in the highest grade of cast iron specified by the British Standards Committee have risen from 11 tons in 1928 to 23 tons in 1941, measured on 1.2-in. bars. Corresponding figures for the 0.875-in. dia. bar are 12 tons and 25 tons. This highest grade, namely, Grade 4, is only slightly less than the highest grade specified in the U.S.A., which is designated 27 tons. It must be remembered, however, that in the American specification the minimum tensile strength specified is irrespective of the size of the test-bar. In passing, it is interesting to note that considerable quantities of high-strength iron castings are at present being made in this country to meet the requirements of the American specification.

This gradual increase in properties has come about in a diversity of ways, and it may be of some interest to check up briefly on the different trends which have led to this, neglecting for the moment special types of medium and high alloy content, such as martensitic and austenitic cast iron.

"Semi-steel"

The gradual introduction of so-called semi-steel during the 1914-18 period marked the real commencement of this improvement. It was extremely unfortunate that this misleading term was ever used, because even if 100 per cent. steel scrap is used in the production of grey cast iron, or white or chilled cast irons for that matter, the resulting product does not possess any properties of a steel-like nature. "Special process cast irons" or "steel mix cast irons" would have better described the products, since they have carbon contents in the cast-iron range and are to all intents and purposes non-ductile materials, although in some cases they may possess enhanced resistance to shock.

About 1916 David McLain, in the U.S.A., did much to popularise so-called semi-steel by producing comparatively thin walled castings from cupola melted metal containing considerable percentages of steel scrap added to the cupola burden. He was probably the first foundryman to have a true idea of the mechanism by which steel is carburised in the cupola and subsequently melted. It is true that there are records that steel scrap, as such, had been melted in cupola mixtures probably 50 years before McLain's time, but in most cases the metal was used for heavy section castings or castings which did not have to be machined, and the silicon reduction inevitable from such mixtures did not cause any real trouble. As far as records go, McLain did make some effort to adjust the carbon/silicon balance in his semi-steel for thin-section castings, by the use of high-silicon pig-iron. He also was alive to the fact that manganese additions were necessary to counteract the low manganese content of steel scrap and also to balance the greater sulphur increment which he experienced when melting even moderate proportions of this material.

The increased strength claimed by McLain for his semi-steel was undoubtedly due to the reduced quantity of carbon in his cast iron and, in particular, to the amount of free graphite with the production of a pearlitic rather than a partly ferritic matrix. He did not lay great stress on the phosphorus reduction due to the dilution effect of the steel scrap, because most native American pig-irons are low in phosphorus in any case.

Emmel Process

Two processes for the production of cast iron of comparatively low carbon content began to be given a good deal of attention about the year 1924. One of these was the Thyssen-Emmel process, the patent for which was not applied for in this country until early in 1926. Its aim was to produce really high-strength cast iron with properties which would now be considered as fulfilling the requirements of B.S.S. 786, Grade 3, and this was achieved by the use of not less than 50 per cent. steel scrap in the cupola burden, with the addition of ferro-silicon also to the furnace charge, and in that way obtaining a comparatively low-carbon material with a suitably balanced silicon content to ensure good machinability. The phosphorus content was kept low, normally under 0.15 per cent., and the manganese content rarely less than 1.0 per cent. The physical properties obtained with this material were excellent as far as they went, but the process really never became popular in this country.

Meehanite Process

About the same time Ross-Meehan Foundries, in the U.S.A., were launching their Meehanite process for the production of medium- and high-strength cast irons in which, in addition to the use of low-phosphorus materials, the percentage of steel scrap used increased as the desired total carbon content decreased. In this case ladle treatment was made by introducing calcium silicide as a spout addition. This method of adding silicon made use of its well-known graphitising properties and rendered a hard base iron soft and machinable, but yet enabled high strengths commensurate with the low-carbon content to be maintained. Very low-phosphorus contents were sought and the essence of the process in the higher strength ranges was the so-called inoculation effect of the late additions of calcium silicide. This prevented the formation of grain boundary graphite or dendritic graphite patterns, which are more prone to form in low-carbon iron (*i.e.*, with total carbon under 2.9 per cent.) and which greatly weaken the structure of the iron.

Ni-Tensyl Iron

Ni-Tensyl iron was also introduced about the same time. In this process nickel, as well as silicon, is used as the graphitising agent, and consequently slightly higher carbon contents are permissible with-

out loss of strength. Ni-Tensyl iron and the higher grades of Meehanite will normally meet the requirements of B.S.S. 786, Grade 3, but to meet the Grade 4 specification, something better is required unless comparatively low-carbon contents are used. Low carbon usually leads to poor castability and liquid shrinkage troubles. Therefore, the next step was to make use of small additions of molybdenum to these special processed irons. Molybdenum is the best alloying element for giving increased strength at equal carbon levels.

Acicular Cast Iron

For the average foundry the simplest way to meet the Grade 4 specification, and also Grade 3 for that matter, is to use pearlitic nickel molybdenum grades of cast iron with total carbon contents in the range of 2.9 to 3.2 per cent. The usual nickel content will be 1.5 to 2.0 per cent., and the molybdenum content 0.3 to 0.6 per cent., according to properties required and carbon level.

The latest addition to the range of high-strength cast irons is that type now commonly known as acicular cast iron. A very large amount of work has been carried out during the war to inaugurate and facilitate the commercial production of cast irons of this type, particularly those having a carbon level of approximately 3.0 per cent. Following the work by Reece and Flynn in America, which was mostly concerned with the production of acicular cast irons at a carbon level of 2.5 per cent., it was found that this work could be converted to the production of cupola melted cast iron with a total carbon content of approximately 2.9 to 3.1 per cent. The properties of nickel and molybdenum can be made use of to suppress the pearlitic change point and, provided the alloy content is correctly adjusted, cast irons with a matrix consisting almost entirely of the acicular intermediate product can be produced. The production of these cast irons is covered in this country by British Patent No. 545,102 by a process which associates the controlling of the nickel and molybdenum contents in cast iron to produce acicular structures in the as-cast condition in castings of varying sectional thickness and mass. The nickel and molybdenum contents must be correlated with the cooling rate of any particular casting if that casting is to possess the desired structure and high mechanical properties associated with it.

This has been a very great step forward and has added to the available range of cast irons where high strength is required. Acicular cast iron is very much tougher than any of the pearlitic cast irons of lower or equal strength, and although the material is still a graphitic iron and must be classed as being practically non-ductile, its properties render it suitable for very many applications where a non-ductile high-strength material with reasonable shock resistance is desirable.

The tensile strength of acicular cast iron with a carbon content of about 3.0 per cent. will vary between 25 and 35 tons per sq. in., but these figures can be maintained in quite large sections. Since the cooling rate must be correlated with the composition, the usual method of assessing the properties of cast iron from comparatively small diameter test-bars, *e.g.*, 1.2 in. diameter, is not sufficient to measure the qualities of this material. In the pearlitic cast irons there is a very considerable decrease in tensile strength and other mechanical properties as section sizes increase, whereas in acicular cast iron the alloy content without modifications to the amount of carbon and silicon present can be so adjusted to maintain high strength in test-bars cut from large sections, say, up to 6 in. dia. and over.

In passing, it may be mentioned that this type of cast iron is proving highly satisfactory for a number of specialised applications, including hot- and cold-forming dies, Diesel engine crankshafts, gas and air compressor crankshafts, machine-cut gear wheels, hammer and press columns and a wide variety of applications where a very rigid high strength type of material is required.

Compositional Changes

Before leaving the actual compositional aspect of cast iron, it might be well to recall that one of the greatest changes which has taken place during the period under review concerns the general reduction of phosphorus in most classes of engineering castings. Purely hematite cast irons have, of course, always been used for certain applications, for example, heat-resisting castings such as ingot moulds, but engineering castings in 1914 were mostly made from phosphoric cast irons. The automobile industry was the first to focus attention on this reduction of phosphorus content, due to the difficulty of producing certain designs of automobile cylinder blocks from high-, or even medium-, phosphorus containing materials, due to liquid shrinkage troubles.

A great many workers have published much useful work on this subject, but that by W. West is outstanding. His main conclusions are that a maximum top limit of about 0.3 per cent. phosphorus is advisable in the production of really difficult and complicated cylinder blocks and cylinder heads if liquid shinkage porosity is to be avoided, or at least greatly minimised, without having to adopt cumbersome methods of densening and feeding, etc. Recently, G. A. Timmons, of Climax-Molybdenum, presented a very interesting Paper at the 1942 annual convention of the American Foundrymen's Association. This Paper is entitled "The Practical Theory of Shrinkage in Grey Cast Iron," and in dealing with the influence of phosphorus he carried out some very interesting experiments on 4-in. cubes of cast iron. These were made in dry-sand moulds and gated in a particular way so as to ensure constant cooling conditions. After cooling naturally, he cut the cubes in half and carried out very accurate density determinations with a view to ascertaining the void volume which comprises the shrinkage cavity. One-inch cubes were taken from one of the lower inside corners of each sectioned cube and the density was determined in the usual manner. It was assumed that the density of this corner cube represented the density of sound iron throughout the block, and consequently by calcula-

A Review of the Major Changes

tion it was possible to ascertain the void volume in the same base composition with increasing phosphorus contents. It was found that this varied from 0.35 ml. with a phosphorus content of 0.015 per cent. up to 12.75 ml. with a phosphorus content of 0.74 per cent. The base composition, of course, was carefully controlled to be identical in each case.

Use of Phosphide Eutectic

There is still plenty of scope for the application of high-phosphorus cast irons, and on account of their extremely good fluidity, etc., as distinct from castability, they are to be preferred for certain applications, particularly in light sections and where moderate strength only is required. However, it must be realised, particularly when endeavouring to produce heavy-section castings which are to be completely free from liquid shrinkage defects or voids, that phosphorus permits the iron to remain fluid for a longer time at any given cooling rate, and therefore is more subject to shrinkage defects. Undoubtedly phosphorus is still a very useful element and the good performance of marine steam cylinders, locomotive cylinders, etc., made in phosphoric iron prior to 1914 and during the period under review, is to some extent due to the good wearing properties of the phosphide constituent. However, this does not detract from the fact that, even in the production of steam cylinders, air compressors and similar castings where pressure tightness is essential, high-phosphorus contents do tend to give trouble. Where the good castability of the low-phosphorus irons is desirable or essential and good wear-resisting properties are equally important, as in the automobile industry, this may be readily corrected by the addition of small quantities of suitable alloying elements to harden the matrix.

The Sulphur Problem

In the early days of the period under review, particularly during the 1914-18 period and the years immediately after, a great deal was heard about the troubles caused by high sulphur contents in cast iron. Candidly, the Author has never been seriously perturbed by the question of sulphur. Even in low-grade iron it is very rare that sulphur will exceed 0.20 per cent., and any difficulties likely to be experienced with this high figure are readily overcome by seeing that there is an excess of manganese present so that the sulphur is mainly present in the form of manganese sulphide. It is agreed, of course, that even with proper sulphur/manganese balance a high sulphur content will tend to give extra trouble in the machine shop when light castings are being produced, but this is not noticeable in heavy engineering castings.

During the last 10 years or so a good deal has been spoken and written about soda-ash treatment for the reduction of sulphur in cast iron. This treatment certainly does what it is claimed to do, but, unless there are special reasons for very low sulphur contents—for example, in certain types of casting for the chemical trade—it can be dispensed with. It has, of course, a very great field of usefulness in the desulphurisation of cupola-melted metal, which has been produced for steel production by the converter process.

Ladle Metallurgy

The question of ladle additions or so-called ladle metallurgy has been well to the fore in recent years, and the late silicon additions or graphitising additions already mentioned in connection with high-duty cast irons come under this heading. The method is also applicable in the case of most of the alloying elements commonly used, particularly if only small quantities of metal are to be treated. The addition of manganese as a ladle addition has never been very popular owing to irregularities of yield, etc., and in most cases it is better to make ferro-manganese additions to the cupola. The same disadvantages used to be characteristic of ferro-chromium additions, but now it is possible to obtain ferro-chromium mixed with oxidising agents, such as sodium nitrate, to give an exothermic reaction in the ladle, and the result is good yields for the chromium content added.

Briquettes for ladle addition such as Chrom-X or Sil-X come under this heading. Another rather obvious innovation during the period under review is the increased use of refined pig-iron, mostly with comparatively low total carbon contents. This is the natural outcome of the tendency to get phosphorus reduction in engineering castings without having to use excessive quantities of hematite, which would weaken the final product due to its high carbon content, unless steps are taken to counteract this. Undoubtedly the availability of refined pig-iron has been of considerable advantage to the smaller foundries, but any foundry having its own technical control can, in most cases, achieve exactly the same object by the use of steel scrap. One small point may be worth while mentioning, namely, that where foundries attached to engineering shops have considerable quantities of steel scrap which, on account of unsuitable size, etc., cannot be relied on for direct melting, this should be utilised for making cupola-melted synthetic or refined pig-iron. It is a very simple matter to put on a few charges of this material either at the beginning or end of the normal amount of metal required, or to make a special melt for the purpose. Mild-steel scrap can be mixed with 20 to 40 per cent. phosphoric pig-iron, or good-quality scrap iron, with the necessary adjustments of ferro-manganese and ferro-silicon to give a medium-phosphorus pig-iron suitable for remelting. As the percentage of steel scrap is increased, so, of course, is the phosphorus content reduced. Refined pig-iron manufacturers carry out exactly the same process, but only on a larger scale.

It should be borne in mind that most of these refined pig-irons have been put on the market to assist foundries in producing strong irons and that, therefore, they cannot replace hematite pig-iron where this is used for its high-carbon content, as well as for its low-phosphorus content, *e.g.*, in the production of heat-resisting castings such as ingot moulds.

Martensitic Irons

Outstanding additions to the usefulness of cast iron have been seen in the development of martensitic and austenitic alloy cast irons. The martensitic cast irons, particularly the white martensitic cast irons, have been of very great value to the engineering trade on account of their splendid wear-resisting qualities. The major application is, of course, for metal-working rolls, but large quantities are also used in general industries where abrasion resistance is of first importance.

The austenitic cast irons have also proved of inestimable value, one type in particular for its non-magnetic properties (Nomag) and another type for its corrosion- and heat-resisting properties (Ni-Resist). Another type of corrosion- and heat-resisting cast iron which has come into prominence in recent years is the ferritic type of material, containing usually about 30 per cent. chromium.

There are many other irons made for special applications, for example, high-silicon cast iron for acid resistance, but it is impossible to enumerate them all in a brief review of this nature.

To sum up the metallurgical progress of the last 30 years, the following items might be considered outstanding:—

(1) Greater use of low-phosphorus higher strength cast irons.

(2) The use of alloys, and particularly nickel chromium and molybdenum, to give higher strength and many special properties.

(3) The introduction of processed cast irons where graphitising additions or so-called inoculants are used to control structure and graphite size and pattern. Such cast irons are in most cases of the alloy type.

(4) The use of inoculants to extend the range of any type of base composition.

(5) The introduction and application of martensitic white cast irons, austenitic cast irons and the acicular cast irons.

(6) The attainment of high-strength properties in alloy grey cast irons at carbon and silicon levels such as will ensure good casting properties, with the amount of internal liquid shrinkage reduced to a minimum.

Technique of Melting Cast Iron

It may be said at once that 90 per cent. of all grey cast iron is still melted in the cupola furnace and therefore, as far as the industry as a whole is concerned, the advances have not been very great. It is true that hearth-type furnaces have been introduced, mainly of the rotary type and small electric furnaces also, but these are only used for specialised purposes.

The ordinary hearth type of reverberatory furnace, usually called an air furnace, was used long before 1914 for melting certain types of cast iron, *e.g.*, low-silicon iron for chill and grain rolls. The rotary furnace commenced to be developed for cast iron some 17 or 18 years ago. It is very useful for the production of comparatively low carbon cast irons, and hence has proved more helpful to the malleable trade rather than to the grey-iron founders. It is an extremely useful furnace, but has its limitations due to the degree of oxidation losses in melting, including loss of carbon. It has the great advantage that most of these losses can be corrected and adjustments and alloy additions made to the bath of metal before this metal is used. Thus, if one starts off with a bath of metal of low-silicon content, successive portions of this can be treated as required by silicon increments and additions of other graphitisers or conversely additions of carbide formers such as chromium. Unfortunately, in the present state of knowledge, substantial carbon additions are not so readily achieved, and therefore for the production of grey cast iron the amount of steel scrap or similar low-carbon material which can be used is seriously limited. Another great advantage is the ease with which the metal may be superheated and cast at any predetermined temperature.

Electric Furnace Melting

Electric furnaces were in common use for steel melting and the melting of copper base alloys during the period 1914-18, but it was some little time after the first world war before serious attention was given to the various types of electric furnaces for the melting of cast iron. Electric melting for cast iron is still more expensive than other methods, but it has its sphere of usefulness, particularly where comparatively small quantities of metal have to be made to close analysis, *e.g.*, production of individual cast piston rings, automobile and similar liners, etc. Electric furnaces are also very useful for the production of alloy cast iron of medium and high alloy content, on account of the low melting losses, accurate control of pouring temperature, etc.

As far as the cupola is concerned, the period under review has only seen minor changes in regard to design. Much effort, however, has been exerted to improve the working of cupolas and many useful articles have been published on the subject. The general tendency has been to make improvements which will help to give greater regularity of product, avoid excessive carbon pick-up and increase tapping temperature. This has been achieved largely by paying attention to air supply, use of adequate bed coke, reduction of the depth of the melting coke layers or "splits" to the optimum amount and adjusting the weight of the metal charges accordingly.

Jobbing foundries could benefit very greatly by taking steps to improve tapping temperatures. More castings are spoiled by using cold metal than from any other cause. Low tapping temperatures are usually associated with too slow melting rates.

In a recent Paper by F. Hudson and the Author, emphasis has been laid on the desirability of checking cupola melting rates as the simplest guide to cupola efficiency. A melting rate of at least 0.6 ton per hr. per sq. ft. of melting area should be possible in most cupolas, but nothing less than 0·75 ton per hr. should be accepted as really satisfactory.

More progress has been made in the direction of saving labour in the handling of raw material to the cupola, *e.g.*, use of magnets and installation of mechanical charging plant. Recently some attention has been given to the drying or conditioning of the

A Review of the Major Changes

cupola air supply and the use of preheated air, but these improvements are still in the embryo stage.

It is suggested that in future better use could be made of the cupola furnace by an extension of the after-treatment of the molten metal obtained therefrom, either by duplexing or by superheating and refining in suitable mixing and holding vessels. It also seems feasible that the ideal cupola of the future might consist of the air furnace and the cupola charges could be preheated in a cupola-like shaft and finally melted in some type of hearth furnace forming an integral part of the same mechanism. This should give scope for economical melting coupled with the production of high-quality metal.

Moulding and Coremaking

Moulding and coremaking technique has purposely been left to the last part of this review, because it is considered that in the majority of jobbing and general-purpose foundries little real advancement has been made between 1914 and the present time. This is in part due to the fact that moulding and coremaking skill was probably on a much higher level than the metallurgical side at the commencement of the period. The metallurgy of cast iron was in a very backward state in 1914, and of necessity complicated and intricate castings had been produced by the moulder's skill for a great many generations. Hence the difference in the degree of progress during these years between the science and the art of producing grey-iron castings.

The question has sometimes been asked, "What is the most outstanding development of the ironfoundry industry during recent years?" Many foundrymen will say the extension and development of mechanised plant. This is probably correct, but it must be remembered that the number of foundries which can be mechanised depends on the nature and quantity of the product being made. It will be a long time, if ever, before complete mechanisation can be applied to the general run of jobbing or even semi-repetition foundries. The extension of the use of moulding machines and core-blowing machines has certainly been impressive. To a limited degree the introduction of the Sandslinger and even the use of pneumatic tools, such as rammers, has been a noteworthy progressive movement. The introduction of pneumatic tools has probably been much more useful in the fettling department than elsewhere. The cleaning and dressing of castings has also been improved with the extension of the use of shot-blast and other mechanical devices, the most recent of which is the Hydro-blast apparatus. This is indeed a very fine tool for cheapening and improving the cleaning of castings. Unlike the non-ferrous foundry industry, the use of permanent moulds for the production of repetition castings, with the notable exception of centrifugally cast pipes, liners and similar shapes, has not progressed much, and this development should be given much more attention in the future. In wartime the Eaton-Erb die-casting machine has been useful for casting simple shapes, but its scope is distinctly limited. Sand control and the use of colloidal clays such as bentonite and synthetic moulding sand has also been developed with excellent results, but this again has not really reached the smaller jobbing foundry.

In the Author's opinion, the great extension and almost universal use of artificial core binders, mostly of an organic nature with silica sands, to replace naturally bonded sands in the production of cores, has been the one advance common to practically all branches of the ironfoundry trade. About the year 1914 this type of core sand was almost unknown, and even in foundries catering for the automobile industry was very little used. It was only some time after 1918 that it was generally accepted in all types of foundries from the largest to the smallest. The introduction of oil-sand cores has indeed been a great step forward.

Gating Systems

The aspect of ironfoundry practice which has been neglected most concerns attention to gating or feeding systems. Non-ferrous foundries, including light alloy foundries, as well as steel and malleable-iron foundries, have of necessity been forced to pay the greatest attention to the feeding of castings and the elimination of liquid shrinkage defects. In the grey-iron foundry industry, on account of the easy castability of the higher carbon irons formerly used in engineers' castings, there has been a grave tendency to overlook the importance of this.

It would do much to help the reputation of high-strength and special cast irons if this aspect of production was given attention first, instead of last and often only after scrap castings have been produced. Those responsible for the metallurgical section of the trade should also co-operate by developing high-strength grey cast irons with the best possible casting properties so that the moulder's burden may be lightened in these days of an increasing preponderance of difficult and complicated designs.

At the same time, foundry managers and moulders alike must give intelligent study to the fundamental laws which govern the solidification of molten cast iron. In repetition and highly mechanised ironfoundries where castings are often made in very large batches this subject has received a good deal of attention, but even in this section of the trade a great improvement could be made.

(1) Runner systems must be designed so that progressive solidification takes place. This means that moulds should be supplied with hot metal so that solidification occurs progressively either from the bottom upwards or from the outside to the centre, or the centre to the outside.

(2) When the above condition has been fulfilled, self-feeders must be carefully designed so as to provide liquid metal to make up for the liquid shrinkage which will take place during the solidification of the casting proper.

(3) Risers as such should only be used as a method of relieving pressure on the mould, or for the purpose of flowing metal through the mould when this is necessary. Risers must not be confused with feeders. Except in very exceptional cases, rod or puddle feeding must be ruthlessly eliminated in foundry technique.

(4) In order to promote progressive solidification, the location and design of runners must be carefully studied. In castings of unequal sectional thickness, steps should be taken to equalise the cooling rate in thick and thin sections by arranging the runners so that the mould and core surfaces in the thin sections are superheated. This retards premature solidification in thin sections and tends towards equality of cooling rate as compared with the heavy sections.

(5) In flat plates and similar castings the runner system must be designed to reduce distortion on cooling to a minimum. Casting stresses are set up if different areas of a flat surface cool at different rates. For example, when a large flat plate is run from one end, without any appreciable quantity of metal allowed to overflow, casting stresses will be set up in that part of the plate which is remote from the runner, due to the higher combined carbon content arising from the metal reaching this part of the mould at a lower temperature.

(6) Wherever possible, the heaviest or most massive portions of a casting should be in the top of the mould, as these are the last parts to solidify. If such parts must be cast in the bottom of the mould, then steps will have to be taken to see that a supply of liquid metal is available. This, of course, must be provided through "off" type self-feeders, otherwise adequate denseners must be applied. The thinner sections above will solidify before the heavier sections and these will be cut off from a supply of liquid metal to counterbalance the liquid shrinkage which must take place.

(7) Use should be made of the more recently introduced feeding techniques, such as the so-called "atmosphere" feeding. In certain cases "steam" feeding may be readily applied with success, *e.g.*, for hydraulic rams and cylinders.

(8) Where feeding heads are employed, it is essential that they should be designed very carefully, to ensure that the head does not solidify before it has completed the work of supplying molten metal to the casting proper. For example, parallel heads on cylindrical castings are often ineffective, whereas suitably "flared" or tapered heads correctly designed are always successful. In the same way "off" feeders or atmospheric feeders are useless if there is a neck between the feeder and the casting, because this solidifies prematurely and cuts off the supply of feeding metal.

In conclusion, in the Author's opinion, there have not been so many outstanding developments in the production of iron castings from the purely moulding and coremaking aspect as there have been metallurgical advances. However, the most important achievements have been those related to improvement of sand and core materials, extended use of moulding machines, mechanisation of moulding and coremaking operations, improved mechanical handling of moulds, extension and improvement of plant for the fettling of castings. It is reaffirmed that of all these the introduction of oil-sand cores has given the greatest benefit to the largest number of ironfoundries.

Solidification of Castings

Finally, it is considered that too little attention has been given to the solidification of castings, and much work is still required to ensure that all iron castings, simple or complicated, small or massive, are completely sound throughout. Too often castings with undisclosed liquid shrinkage defects are allowed to pass into service, and this is bad for the reputation of iron castings of all types. There must be a concentration of effort by both metallurgists and foundrymen, to prove to engineers that they can supply castings which are reliable in every way and with properties which are, above all things, uniform and dependable. Only in this way can the ironfoundry industry continue to make satisfactory progress.

NOTES FROM THE BRANCHES

WALES AND MONMOUTH BRANCH.—On the occasion of their monthly meeting, held at the Engineers' Institute, Cardiff, on December 1, the branch were honoured in the presence of the president of the Institute, Mr. J. W. Gardom. This, his second visit during his term of office, was greatly appreciated as an indication of his interest in the activities of the branches of the Institute throughout the country. The meeting was first addressed by Mr. Amos, a local member, who had kindly undertaken to present a Paper by an Indian member, Mr. S. G. Athanikar, entitled "Moulding Technique in an Indian Foundry." The Paper described the moulding of a bend pipe and a guide vane piece without the aid of a full pattern. A series of diagrams projected on the screen illustrated the tackle used and the mould assembled ready for casting. A previous study of the subject enabled Mr. Amos to interpret the Author's ideas and put them clearly to his audience. Questions were invited in writing for reference to the Author.

The meeting was later addressed briefly by Mr. Gardom, who invited questions upon foundry and Institute matters. Foundry mechanisation was dealt with, aided by a range of slides. Questions upon Institute procedure and policy were also dealt with to the satisfaction of all present. Mr. A. S. Wall, hon. secretary of the branch, proposed a vote of thanks to Mr. Amos for his able presentation of another member's Paper, particularly seeing that the Author was in India and any consultation was impracticable. In seconding this Mr. W. S. Kinsman looked forward to having a personal effort from Mr. Amos in the near future. Mr. Amos suitably replied.

Mr. H. J. V. Williams proposed a vote of thanks to Mr. Gardom for his visit and his assistance to the branch in maintaining the personal touch between them and the executive body of the Institute. He assured Mr. Gardom that every member appreciated his effort in this direction. Mr. A. Cannard seconded the proposition, which was carried with acclamation.

THE METAL PATTERNMAKER

BY G. S. F. MURRAY

In a recent issue* of THE FOUNDRY TRADE JOURNAL the following interesting statement appeared. "Mr. Sorsby, referring to the patternshop, which one of the Authors had alluded to as the greatest overhead expense of the foundry, said he could not agree with that suggestion. The foundry would be in a sorry plight without the patternshop, and especially the mechanised plants with their demands for exactness. . . . The patternshop could obviously do with developing. The engineers demanded more from the foundry and the foundry demanded more from the patternshop, and the patternmaker was now expected to make metal patterns, and up to the present was rather lacking the tools to meet this new development."

It is unfortunate that many foundry executives do regard the patternshop as the greatest overhead expense. This is true, but, to approach it with that idea at the back of one's mind is fatal. The patternshop is often tucked away in some corner of the foundry with the pious hope that neither it nor its claims would obtrude themselves.

Mr. Sorsby said that the foundry demanded more from the patternshop and the patternmaker was now expected to make metal patterns, and up to the present was rather lacking the tools to meet this new development. An examination of this statement should be helpful, as the demand of engineers from the foundry is now more exacting than ever. Moreover, it is the foundryman's business to meet it. Without a patternshop equipped with modern tools, machinery, and fully qualified men, the founder's task will be impossible. This is obvious, but, unfortunately, not fully realised and acted on.

Patternshop Equipment

If a foreman asks for a lathe he is usually allocated with one from the machine shop which has seen its best days. Would the same management send the same machine to the tool room? Yet the metal patternmaker is expected to produce patterns up to the tool room dimensional standards. The patternshop must be equipped with efficient and modern machinery regardless of first cost.

Fully qualified men are essential. To procure them is a real difficulty, but Mr. Sorsby's statement that "the patternmaker was now expected to make metal patterns" is not the answer. To expect a patternmaker trained to work in timber to make metal patterns is the same as asking a machine moulder to undertake loam moulding. To train a metal patternmaker is not easy in view of the foregoing, and this statement is made from bitter personal experience. The wood patternmaker's speeds and feeds on machine work are suited to wood and it is very difficult to get him to realise that he is working with metal, be it iron, brass or aluminium. The working in these metals demands a different technique. The writer has often set a patternmaker up with a job in cast iron and set the speed and feeds on the machine for him only to return and find the sparks flying. The patternmaker thought the speed was too slow so he stepped it up, with the obvious result of burnt tool edges. Numerous instances could be cited where the same trend of thought was apparent. Moreover, the patternmaker has to be trained in handling precision instruments, the use of which is essential to the production of successful metal patterns.

The best long-term policy is to train the rising generation of patternmakers in both wood and metal. As a short-term policy every endeavour should be made to procure a metal patternmaker for the development of the newer technique. There should be no confusion between a metal patternmaker and a pattern filer. An experienced metal patternmaker should also be able to make gravity and pressure dies.

The mechanisation in the foundry demands the highest skilled man in the metal patternshop. His cost will be repaid with dividends though his initial cost may seem high. For the mechanised foundry he is essential, and the converted wood patternmaker is a doubtful stopgap.

A Recruitment Plan

As there is a dearth of experienced metal patternmakers, the following system has been used to overcome the difficulty. A good turner, universal miller, and a fitter provides the soundest basis for future work. Thus, look around the patternmakers and choose one who knows his job well and has initiative. Then send him to the tool room for a month (at least) to learn the use of the modern precision measuring instruments, also to follow through some of the tools and jigs in the course of manufacture. This will be an invaluable experience to him from which the firm will reap the benefit. When his time is completed in the tool room he should be made marker out for the metal patternshop. His responsibilities in future will be to mark and/or lay out all metal work for the miller, turner or fitter, and to see it through to the finish. He will know exactly what is wanted in the patterns and coreboxes and will be able to instruct the metal workers as to exactly what he wants each to produce. By this method better metal patterns are obtained than leaving them to the wood patternmaker and hoping for the best.

This policy extends the life of the machines, gives a better job, and a quicker delivery. At the same time, leave the other patternmakers to get on with their wood patterns. Many of them are not keen anyhow on tackling metal patterns, as it is dirty work compared with the ordinary wood patternmaking for which they have been trained.

In conclusion, the Author would like to observe that Mr. Sorsby's words "that the patternshop could obviously do with developing" should be underlined. Until they are developed on modern lines in plant and labour the mechanised foundry is working with the brakes on.

*November 8, 1945, p. 210

BRITISH CAST IRON RESEARCH ASSOCIATION

DR. HAROLD HARTLEY ELECTED PRESIDENT

Dr. Harold Hartley (chairman of the Council) occupied the chair at the 25th ordinary general meeting of the British Cast Iron Research Association, which was held at the Waldorf Hotel, London, W.C.2, on December 12. The report of the Council and the accounts, having been circulated, were adopted without discussion.

The CHAIRMAN then referred to the death during the year of the president, Mr. Percy Pritchard. He said that when Mr. Pritchard was elected president of the Association it was felt they had a combination, which was somewhat unusual, of manufacturer and a man with a scientific outlook, one who had, and would have, the affairs of the Association at heart. The most important thing that had happened to the Association during the war period was the acquisition of the Bordesley Hall premises and the transfer there of the headquarters of the Association from St. Paul's Square, Birmingham. It would not have been possible to effect that transfer if it had not been for the support of Mr. Pritchard and the group of companies which he represented. Bordesley Hall would remain, so long as it was occupied by the Association, as something of a memorial to the work and help of Mr. Pritchard. Shortly after the death of Mr. Pritchard, an appreciation appeared in the publication of the Association, but it would not have been in accordance with the wishes of the meeting if this opportunity had not been taken once again to put on record their appreciation of him.

Election of New President

MR. P. H. WILSON then proposed the election of Dr. Harold Hartley as president of the Association and spoke of the great interest he had taken in the affairs of the Association for a very long period. He had held the position of chairman of the Council for the past seven years, but time after time Dr. Hartley had said to him that somebody else ought to be doing the job. However, during the war and under very difficult conditions, including the health point of view, Dr. Hartley cheerfully continued to carry out the duties of chairman of Council, and the position of the Association at the present time amply testified to the efficiency and success of the guidance given by Dr. Hartley. Before becoming chairman of the Council he was chairman of the Research Committee for a similar number of years. Therefore, they were not now putting into the high and responsible position of president a mere figurehead. Dr. Hartley, with his experience and his association with the cast-iron industry generally, was undoubtedly the best man for the position. In that post, of course, he would continue as an ex-officio member of the Executive Committee and would always be willing to give his advice and guidance. For some years he had taken a long-term view of the development of the Association and everybody hoped that his health would improve so that during his term of office he would see some of the developments which had been discussed so often during the past few years materialise.

DR. J. E. HURST, seconding the proposition, said that as chairman now of the Research Committee he could do so feelingly because Dr. Hartley had been relentless in his driving force as applied to the Association through the chairman of the Research Committee. Anything the Research Committee had done during the past few years had been really due to the drive put into affairs by Dr. Hartley. It was also true to say that Dr. Hartley had guided the Association through three sets of negotiations for five-year plans with the Department of Scientific and Industrial Research, the last of which the Association was now entering upon and any advantage the Association had gained from these plans was entirely due to the efforts of Dr. Hartley.

The proposal was adopted with hearty acclamation.

Acquisition of Bordesley Hall

DR. HARTLEY, expressing his appreciation, said he was pleased that Bordesley Hall had been acquired and that the affairs of the Association were now on a sound basis. He well remembered those full-moonlight nights which occurred once a month a few years ago when they wondered whether the next morning there would be anything left of the laboratories in St. Paul's Square. It was owing to the threat of the German bombers that the Council really got active and acquired Bordesley Hall. The Executive Committee had worked as a good team. When he first became chairman of the Council he expressed the view that holders of offices of that type in the Association should change with regularity. He did not think it a good thing to have anything in the nature of a permanent chairman of Council or permanent chairmen of important committees, and had it not been for the war he would not have occupied the chairmanship of the Council for so long. The Executive Committee was formed to meet the conditions of the time, as it was felt impossible to get members of the Council to attend frequent meetings. Therefore, authority was delegated to five or six people and that small Committee had met once a month or once every six weeks all through the war. The Association as a whole owed a great deal to these men and should be heartily thanked for what they had done. That Executive Committee was to continue. A year or so ago as chairman of the Council he asked whether that Executive Committee should be abolished lest the members began to forget that they were servants of the Association and were not the Association. The fact that the Association decided to continue the Executive Committee was evidence that the heads of the members of it had not become too inflated and he did not think there had been any inflation since. Under the chairmanship of Mr. Wilson he was sure the Executive Committee would continue to prove very effective. It was true, as Dr. Hurst had said, that

British Cast Iron Research Association

he had put some pressure on him as chairman of the Research Committee, but that was because he felt Dr. Hurst could stand it and was extremely energetic. Undoubtedly Dr. Hurst's chairmanship of the Research Committee had been very effective.

Thanks to Retiring Vice-presidents

The PRESIDENT then proposed the following resolution: "That the warmest thanks of the Association be accorded to Mr. J. F. Davies, Mr. J. E. V. Jobson, Mr. W. B. Lake, Mr. P. H. Wilson and Mr. Fitz-Herbert Wright, vice-presidents retiring under Article 23."

MR. T. MAKEMSON seconded, and the motion was carried with acclamation.

MR. FITZHERBERT WRIGHT then proposed: "That Mr. H. H. Berresford, Mr. V. W. Bone, Mr. R. J. Rogers, Mr. E. Player, Mr. J. Shaw and Mr. G. A. Ure be elected vice-presidents in accordance with Article 23."

In doing so, he said that whilst he knew, from his own term of office on the Council, that it did admirable work, he sometimes felt that the work done by the Association did not always reach the right quarters which would get things done. That might be the fault of the industrialists or of the Association; personally he thought it was the former, and he left that thought with the Council to follow up if they thought fit.

MR. W. THOMAS seconded, and the motion was carried unanimously.

Election of Council

The PRESIDENT remarked that a large proportion of the Council retired each year and were eligible for re-election. Two members of Council due to retire had signified their wish to be relieved of membership of the Council.

MR. J. SHAW then moved: (*a*) "That the following members of Council, retiring automatically under Article 27, and eligible for re-election, be re-elected: Dr. W. T. Griffiths; Mr. T. M. Herbert; Mr. W. B. Parker; Mr. S. H. Russell; Mr. H. H. Shepherd; Mr. P. H. Wilson, and Mr. G. R. Webster. (*b*) That the warmest thanks of the Association be tendered to Mr. J. Arnott and Mr. A. J. Burn, retiring members of Council."

MR. N. R. REES seconded.

The motion was carried unanimously.

On the motion of Mr. V. C. Faulkner, seconded by Mr. T. M. Herbert, Overton, Salt & Company, chartered accountants, were elected auditors for the ensuing year.

Votes of thanks were accorded to the Council and committees, the chairman and to the staff.

THE METALS RESEARCH INSTITUTE, an American organisation, has been launched to carry on research work on pearlitic malleable iron. The work will be undertaken at the Battelle Memorial Institute.

TECHNICAL INFORMATION ABOUT GERMAN INDUSTRY

The collection of this intelligence was originally carried out under an Anglo-American organisation known as the Combined Intelligence Objectives Subcommittee. Since the disappearance of the Combined Command on the Continent the work has been continued under separate British and American organisations, but the principle of pooling all the information collected has been maintained. Teams of experts, drawn from the Services, Government departments, research organisations and industry, went out on the heels of the Allied armies. At this stage they were mainly in search of information that might help in the prosecution of the war against Japan. Since the end of hostilities the emphasis has shifted more and more towards peacetime plant and processes. Already a considerable amount of scientific and technical information has been obtained, particularly in the field of chemicals, dyestuffs, rubbers, plastics, petroleum, synthetic oil and metallurgy.

It is the Government's policy to put this information at the disposal of industry as soon as possible. Similar arrangements for publication are being made in the United States by the Office of the Publication Board of the Department of Commerce, Washington. Reports, as they are published, will be distributed to the chief public libraries, to universities and professional institutions, and to the trade associations concerned. A limited number of copies will also be on public sale, and may be ordered from H.M. Stationery Office.

The following reports of interest to the foundry and allied industries are now available. The prices given between brackets include postage.

CIOS XII—21, "Steelmaking in Belgium and Luxemburg during German Occupation" (2s. 8d.); CIOS XX—6, "Burbach Eisenhütte," Saarbrücken: Description of Steelworks, including Recovery of Vanadium" (1s. 1d.); CIOS XXII—3, "Rockling'sche Eisen and Stahlwerke, G.m.b.H.: Steelworks at Volklingen, near Thionville, Saar" (2s. 8d.); CIOS XXII—4, "Aluminium Woerwerke, Erbtwerke Gravenbrioch: Electrolytic Production of Aluminium from Bauxite, Recovery of Aluminium from Dross and Scrap" (1s. 1d.).

4-TON OPEN-HEARTH FURNACE

The construction and operating characteristics of an experimental 4-ton open-hearth furnace installed by the Jones & Laughlin Steel Corporation at Pittsburgh, Pa., are dealt with by H. K. Wosh and W. R. Webb in a Paper contributed to the American Institute of Mining and Metallurgical Engineers. The furnace has produced about 2,100 tons of steel since it was installed in 1938, having undergone various modifications since then as a result of operating experience. The performance of the furnace is stated to have exceeded all expectations, both in production and as a research and development unit.

DALE
DALE
STANTON
DALE Refined PIG IRON
The High-Quality Iron for High-Duty Castings.
Made in seven standard grades or to individual requirements, this iron has a close grain structure and fine graphitic carbon content. It replaces Hematite, and tones up high phosphorus irons.
We also make Dale Refined Malleable Iron to any required specification.
THE STANTON IRONWORKS COMPANY LIMITED
NEAR NOTTINGHAM

NEWS IN BRIEF

THE COURT OF GOVERNORS of the Administrative Staff College have accepted an offer by Lord Hambleden of the loan of "Greenlands," his riverside home at Henley-on-Thames, for use as a College building.

THE DOVER ENGINEERING WORKS, LIMITED, have returned to their pre-war premises at Dover after being evacuated to Watford during the war period. Among the firm's contribution to the war effort was the making of covers and frames for the Mulberry Harbour.

A PAPER ON "Glass and Photography" will be read by Mr. A. J. Holland, M.Sc., Ph.D., D.I.C., of the Department of Glass Technology, University of Sheffield, at a meeting of the Association for Scientific Photography to be held at the theatre of the British Council, 6, Hanover Street, London, W.1, on January 3, at 6.15 p.m.

SIR STAFFORD CRIPPS, President of the Board of Trade, made an appeal to Scotsmen to start new Scottish industries themselves when he addressed Edinburgh Chamber of Commerce on December 14. In the Scottish development area it was calculated that new employment would have to be found for 143,000 men and women, he said.

THE FRENCH GOVERNMENT have just placed orders with the Wellman Smith Owen Engineering Corporation, Limited, for 24 level-luffing dockside cranes of large lifting capacity for installation at the devastated French Channel ports and the naval yards at Brest and Toulon. The cranes are of a new design recently patented by the company, and the contracts involve the export of British machinery to the value of three-quarters of a million pounds. The Wellman Corporation have recently shipped similar cranes to Russia.

ADDRESSING the Cleveland miners' section of the National Union of General and Municipal Workers, Mr. R. Ewart, M.P., repudiated a statement by "irresponsible people" that the Cleveland ironstone mining industry would diminish or expire in the immediate post-war years. Expert opinion, he said, was that the mines should continue for the next 10 or 20 years to supply ironstone for the steel industry of the district. The iron-ore industry would have to be made more attractive for the recruitment of new labour and a high regard would have to be paid to an adequate wage.

THE INDUSTRIAL COURT have decided against a claim by the members of the British Roll Turners' Trade Society in the employment of the Lancashire Steel Corporation, Limited, "for an increase in wages of 10s. 9d. per week to maintain the differential previously existing between roll turners and skilled craftsmen at the Irlam works of the company." The attention of the Court was drawn to an agreement dated December 17, 1941, between the Iron and Steel Trades Employers' Association and the British Roll Turners' Trade Society. The employers submitted that there was no justification for a departure from the provisions of the agreement, and the Court concurred.

OBITUARY

MR. K. W. B. WARSÖE, of Fredrickstat, Norway, one of the most prominent Norwegian foundry owners, died on December 11.

MR. SAMUEL PARSONS, of Cradley Heath, who had carried on business as a tube manufacturer for many years, has died at the age of 82.

MR. JOHN PATERSON, a director of Park & Paterson, Limited, metal merchants and alloy manufacturers, of Glasgow, died on December 13.

MR. JOHN NEWTON, chairman of Newton & Bennett, Limited, engineers, of Manchester and London, died suddenly on December 12 at Rhos-on-Sea, in his 77th year.

MR. GEORGE JAMES MACFADZEAN, of Redcar, died recently, aged 76. He was coke-oven by-products manager to the Consett Iron Company, Limited, prior to his retirement in 1935.

MR. HENRY N. NEGRETTI, senior member of the London firm of Negretti & Zambra, makers of scientific and industrial instruments, died recently, aged 63. He had been head of the firm since 1921.

MR. CHARLES HERBERT SANKEY, retired chairman and managing director of J. H. Sankey & Son, Limited, manufacturers of firebricks and fire cements, died on December 12 at his home at Tunbridge Wells, aged 81.

MR. N. NISBET died recently at his home at Scunthorpe. He was 71. Mr. Nisbet was for many years buyer for the Appleby-Frodingham Steel Company, Limited. He retired in 1939 after 37 years with the company.

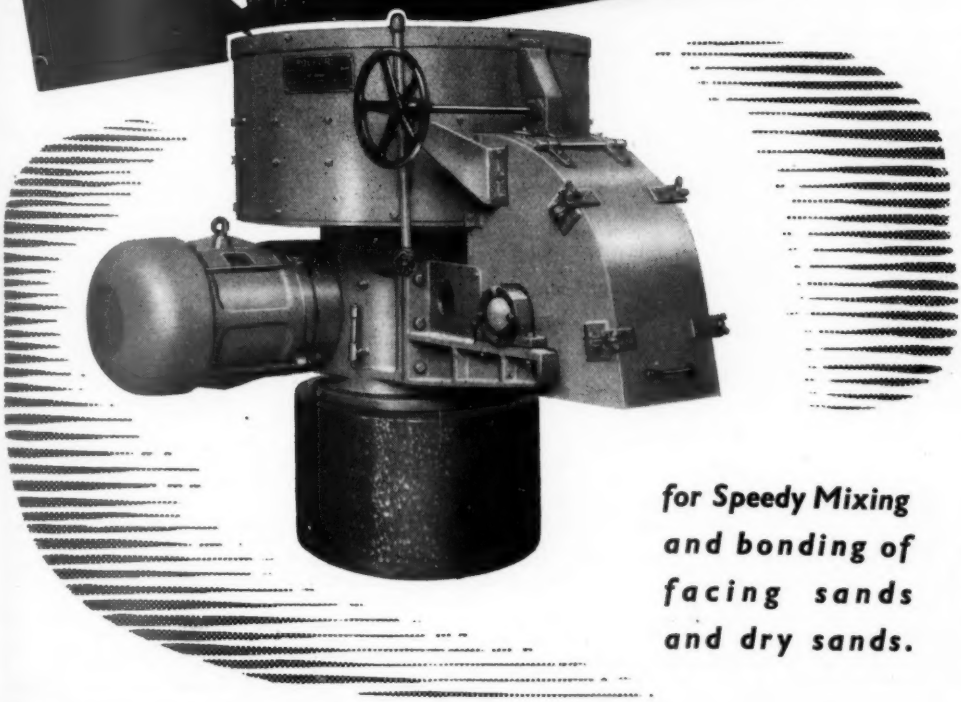
SIR ALBERT BENNETT, BT., died on December 14 at the age of 73. He was actively connected with the development of the Rhodesian copper field, and also was chairman of Ransome & Marles Bearing Company, Limited, and a director of the American Metal Company, of New York.

DR. E. F. ARMSTRONG, F.R.S., the eminent chemist, died on December 14, aged 67. He was Scientific Adviser to the Ministry of Home Security from 1939-45, president of the Society of Chemical Industry from 1922 to 1924; chairman of the British Association of Chemists in 1926; and chairman of the British Standards Institution for 1934-35 and for 1937-38.

MR. JOHN TAYLOR, joint managing director and vice-chairman of Mather & Platt, Limited, of Manchester, until his retirement in 1942, died on December 13, aged 84. While a young man, he joined the Chemical Fire Engine Company, and afterwards became a partner in the firm of Dowson & Taylor, fire engineers, of Bolton. While with this firm he developed an automatic sprinkler fire extinguisher, and later developed other mechanism of the same kind. When Mather & Platt became a limited company in 1899 they absorbed the firm of Dowson & Taylor, and Mr. Taylor was one of the original directors of the new company. He played a leading part in the development of the company's Park Works at Newton Heath. For his services during the 1914-18 war he was awarded the C.B.E.

PAT. Nº 570997

"POLFORD" REGISTERED MOTOR DRIVEN MIXER MILLER WITH DISINTEGRATOR



for Speedy Mixing and bonding of facing sands and dry sands.

SOLE AGENTS :

THOS W. WARD, LIMITED, Albion Works, Sheffield

TELEPHONE: 26311 TELEGRAMS: FORWARD SHEFFIELD

PERSONAL

MR. S. A. GASKELL and MR. A. D. MACKENZIE have joined the board of Bruce Peebles & Company, Limited, of Edinburgh.

MR. E. L. CHURCH has been appointed to the board of directors of Hattersley & Ridge, Limited, steel and tool manufacturers, Sheffield.

MR. GEORGE M. SMIBERT has been appointed a director of the North Eastern Marine Engineering Company (1938), Limited, Wallsend.

MR. W. B. LAKE, J.P., founder of Lake & Elliot, Limited, has relinquished his position as chairman and managing director, but remains a member of the board.

MR. E. S. LITTLE has been appointed secretary of the British Thomson-Houston Company, Limited. Mr. Little, who is a director of the company, will combine the duties of secretary with his existing duties as comptroller.

LIEUT.-COL. PETER WRIGHTSON, of the Durham Light Infantry, has been awarded the O.B.E. for gallantry and distinguished service in Italy. Lieut-Col. Wrightson is a director of Head, Wrightson & Company, Limited, Stockton-on-Tees.

MR. R. A. STILES has been appointed sales superintendent of the Penistone steel and bronze foundries of David Brown & Sons (Huddersfield), Limited. Previously he had been their technical representative in the Midlands area for several years.

MR. E. J. KELLY, a prominent member of the Wales and Monmouth branch of the Institute of British Foundrymen, recently broadcast in the B.B.C. Welsh programme during the feature "Around and About—What People are Doing and Saying in Wales This Week." He made an appeal for technical co-operation.

LT.-COL. H. RIGGALL, J.P., a director of Ruston & Hornsby, Limited, has been elected president of the British Engineers' Association for the ensuing year. Col. Riggall first joined the Council of the Association in 1935 and became a vice-president in 1942. He succeeds MR. CECIL BENTHAM, who had held office as president of the B.E.A. since October, 1942.

MR. JAMES A. MARTIN, who for 33 years was manager of the Codnor Park Works of the Butterley Company, Limited, received a presentation at a gathering at the works on December 15 at which some 70 officials of the company were present. Mr. Martin took over the managership of the works in January, 1912, a position he held until the beginning of 1945, when he retired, to be succeeded by MR. E. C. HOOK.

MR. HARRY WATT, who has been associated with the firm of Watson, Laidlaw & Company, Limited, engineers, of Glasgow, for almost 60 years, and is at present joint managing director, is retiring from active participation in the management of the business at the end of the year, but will retain his seat on the board and act as deputy chairman. MR. ROBERT W. LAMONT, joint managing director, will be managing director as from January 1 next.

MR. A. P. NEWALL, chairman and managing director of A. P. Newall & Company, Limited, Woodside Engineering Works, Possilpark, Glasgow, received a presentation on Friday, December 14, as an acknowledgment of his distinguished services to the nut and bolt industry. The presentation was made by Major C. R. Dibben, independent chairman of the Bolt and Nut Associations of Great Britain, and took place at Mr. Newall's home in Ayr. Mr. Newall has been a pioneer in the manufacture of heat-treated steel bolts.

MR. K. E. GREIG having expressed his wish to retire from active business, the directors of Scotts' Shipbuilding & Engineering Company, Limited, have accepted with regret his resignation from the board and from his position as managing director of the company. MR. R. BROWN, engineering general manager, has been appointed a director and general manager of the company, and MR. ARCHIBALD ALEXANDER, who retains his present position of secretary, has also been appointed a director. MR. FRANK WALTER BENSON has been appointed shipbuilding general manager.

CONTRACTS OPEN

Any date given is the latest on which tenders will be accepted. The address is that from which forms of tender may be obtained.

Bexley, January 5—Sewer ironwork for the year ending March 31, 1947, for the Borough Council. The Borough Engineer and Surveyor, Council Offices, Bexleyheath, Kent.

Birkenhead, January 9—Iron castings, wrought iron, steel reinforcement, etc., for the 12 months ending March 31, 1947, for the Corporation. The Borough Engineer and Surveyor, Town Hall, Birkenhead.

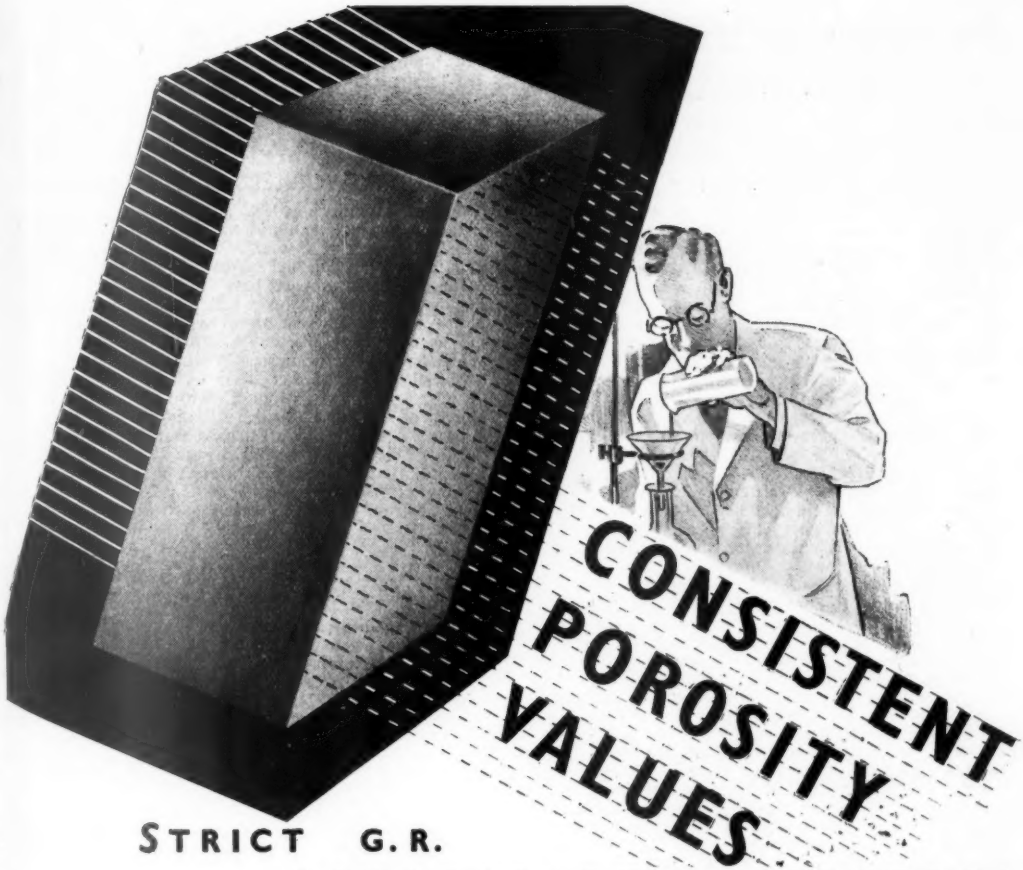
Leeds, January 14—Sewer ironwork stores, for the Town Planning and Improvements Committee. Mr. W. S. Cameron, city engineer, Civic Hall, Leeds, 1.

South Molton, January 1—Laying and excavating of 244 yds. of 8-in., 80 yds. of 6-in., and 120 yds. of 4-in., and 100 yds. of 3-in. cast-iron gas mains and specials, for the Borough Council. The Engineer and Manager, Gasworks, Parsonage Lane, South Molton, Devon.

Stratford-on-Avon, January 16—Construction of about 13,800 yds. of 5-in., 4-in. and 3-in. dia. water mains, for the Rural District Council. Willcox, Raikes & Marshall, 33, Great Charles Street, Birmingham, 3. (Fee £5 5s., returnable.)

STAVELEY COAL & IRON COMPANY

The Staveley Coal and Iron Company, Limited, announce that, as from December 31, Edmonds, Sims & Company will no longer act as their selling agents for pig-iron in the Birmingham district. Their interests will be looked after by Mr. C. R. Muras, who has joined the staff of the company. He will operate from the Staveley Company's offices, York House, Great Charles Street, Birmingham, 3.



STRICT G.R.

MANUFACTURING CONTROL

CONSISTENT porosity values are maintained at all "G.R." works within very narrow limits by controlling the quality of raw materials, gradings, tempering, pressing and firing. Porosity tests are one of several applied regularly throughout the daily manufacturing schedule. They provide tangible evidence of the maintenance of those highly prized characteristics of G.R. products—reliability and length of service. "G.R." engineers are available for advice on the choice and application of refractories and are at the service of executives in all industries using refractories.

FIREBRICKS · BASIC BRICKS
ACID-RESISTING MATERIALS
INSULATION · SILLIMANITE
AND HIGH ALUMINA BRICKS
SILICA BRICKS · PATCHING
AND RAMMING MATERIALS
REFRACTORY CEMENTS · SANDS
187

GENERAL REFRACTORIES
LIMITED
GENEFAX HOUSE · SHEFFIELD 10 TELEPHONE · SHEFFIELD 31113

Raw Material Markets

IRON AND STEEL

Pig-iron production is carefully regulated to cover, but not to exceed, industrial requirements. The imperative need for the utmost economy in the use of fuel precludes the manufacture of pig-iron for stock, but it is evident that the expansionist trend in the foundry trade can only be sustained on a bigger consumption of iron. Steel production also is rising, involving a heavier demand for basic iron, and as a direct consequence the aggregate output of pig-iron in November was substantially in excess of the figure for the previous month. This increased production has been materially assisted by the distribution of much larger tonnages of high-grade foreign ores, which has increased the yield of individual units without necessitating the employment of a larger number of blast furnaces.

Reflecting the exceptional activity of the sheet mills, the consumption of sheet bars is on an unprecedented scale, while re-rollers are pressing for still larger tonnages of steel billets. Supplies from home sources have probably reached the limits attainable and any additional tonnages needed will have to come from external sources. This position has not been unforeseen and it is understood that further shipments are on the way from the Dominions.

A common feature of the trade in steel plates, sections and sheets is that light material is much more generally specified than the heavy sizes. The balance is likely to be restored when reconstruction work gets into its stride and the new construction programmes at the shipyards are further advanced. Meanwhile, the plate mills have plenty of orders to carry them over the next two or three months and the sheet mills for far longer periods.

Power plant producers, locomotive and wagon builders and tube makers all provide strong support for the steelmakers, and the volume of inquiries for British steel in the export markets is increasing at a pace which may possibly have been accelerated by the fears of a big American steel strike. But British exporters have no need to base their hopes of prosperity on labour troubles elsewhere since the world demand for steel far exceeds the supply.

NON-FERROUS METALS

It would seem that the situation in the Malayan tin industry is less serious than was at one time feared. The engineers who have been inspecting the properties have forwarded a report which is not unencouraging. It seems likely now that next year will see a considerable expansion of the quantity of tin coming in from the Far East. The supplies will be very welcome, for strict economy in the use of tin has had to be exercised since Japanese aggression cut off supplies from Malaya and the Dutch East Indies. Copper supplies are forthcoming quite readily and there appears to be no shortage of zinc. Lead is in another category, for it is obvious that world consumption is at the moment outstripping production. This fact has led to suggestions that an increase in prices may take place. Users of aluminium and other light metals are able to secure all the supplies they require.

FOUNDRY WORKERS PLAN NEW UNION

The trade unions catering for foundry workers are planning to amalgamate into one new body, the Amalgamated Union of Foundry Workers of Great Britain and Ireland. A number of meetings of representatives of the unions concerned have been held and a scheme has been drawn up on which it is expected that a ballot of members will be taken early next year. The unions concerned are the National Union of Foundry Workers; the Ironfounding Workers' Association; the National Union of Stove, Grate, and General Metal Workers; the Amalgamated Moulders' Union; the North of England Brass, Aluminium, Bronze, and Kindred Alloys Moulders' Trade and Friendly Society; the Iron, Steel, and Metal Dressers' Trade Society; the United Metal Founders' Society; the Associated Society of Moulders and Foundry Workers, and the General Iron Fitters' Association.

IMPORTS AND EXPORTS OF IRON AND STEEL

Imports of iron and steel and manufactures thereof last October were valued at £414,749, according to Board of Trade returns. There was a big reduction compared with October, 1944, when imports were valued at £2,703,721. Imports in the 10 months ended October were £5,895,783, compared with £28,187,690 in the 10 months of 1944. Imports of iron ore and scrap in October amounted to £1,310,266 (£896,502 in October, 1944), and in the 10 months to £13,017,372 (£7,670,802 in 1944).

Exports of iron and steel and manufactures thereof were of a total value of £3,139,038 in October, 1945, and £15,142,522 in the 10 months, against £1,025,344 and £6,871,966 in October and the 10 months of 1944 respectively.

WEAR RESISTANCE OF CARBIDE DIES

The tremendous wearing properties of carbide dies of Rockwell hardness from 65 to 73 are demonstrated by the fact that in an electrical manufacturing plant in Pittsburgh, a disc or "cookie" die approximately 4 in. dia. started work several years ago blanking a circle of silicon electrical sheet 0.025 in. thick used in rotors and stators. At the latest count, this original die had completed the total of over 500,000,000 stampings. Two other similar dies, says a recent issue of the "Iron Age," were put into production, and they, too, are averaging between 50 million and 60 million blanks per grind.

FOUNDRY TRADE JOURNAL

EST. 1902

WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

VOL. 77. No. 1532. DECEMBER 27, 1945.

Registered at the G.P.O. as a Newspaper

Offices: 49, Wellington Street, Strand, London, W.C.2

Single Copy 6d. By post Annual Subscription, Home and Overseas, 31/- (Prepa

ST ENGINEERING

PRICE'S

REBRICKS

ed by all the leading Iron Steelworks and Foundries at Home and Abroad

factured by

PRICE & CO. LTD.

STOURBRIDGE

BY FAR THE MOST POPULAR IN THE TRADE

Sterling

ROLLED STEEL

MOULDING BOXES

STERLING FOUNDRY SPECIALTIES LTD., BEDFORD

JAN 2 5 1946

MANSFIELD MOULDING SAND

● PULVERISED READY FORUSE IF REQUIRED

ALBION (Mansfield) SAND CO.

Prop.: THOS. W. WARD LTD. Head Office: Albion Works, SHEFFIELD

Telephones: Sheffield 26311 (15 lines) Mansfield 37

BMM

SPEED

PRODUCTION

BRITISH MOULDING MACHINE CO., LTD.

FAVERSHAM, KENT.

TEISEN

ENAMELLING MUFFLES.

KING'S NORTON, BIRMINGHAM

HYDRO-BLAST

Removes cores... cleans castings... reclaims sand

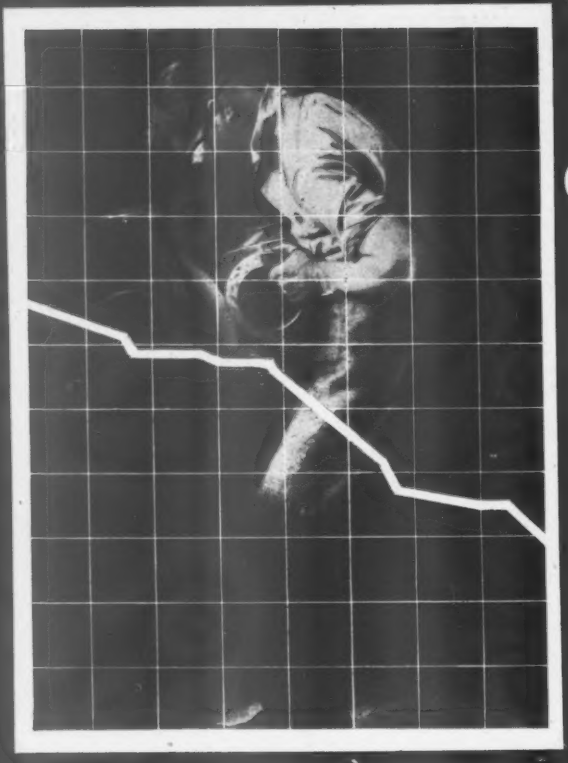
Built by

PNEULEC LTD., SMETHWICK, Nr. BIRMINGHA

Keep your Grinding Costs Low

by specifying

CARBORUNDUM & ALOXITE BRAND GRINDING WHEELS

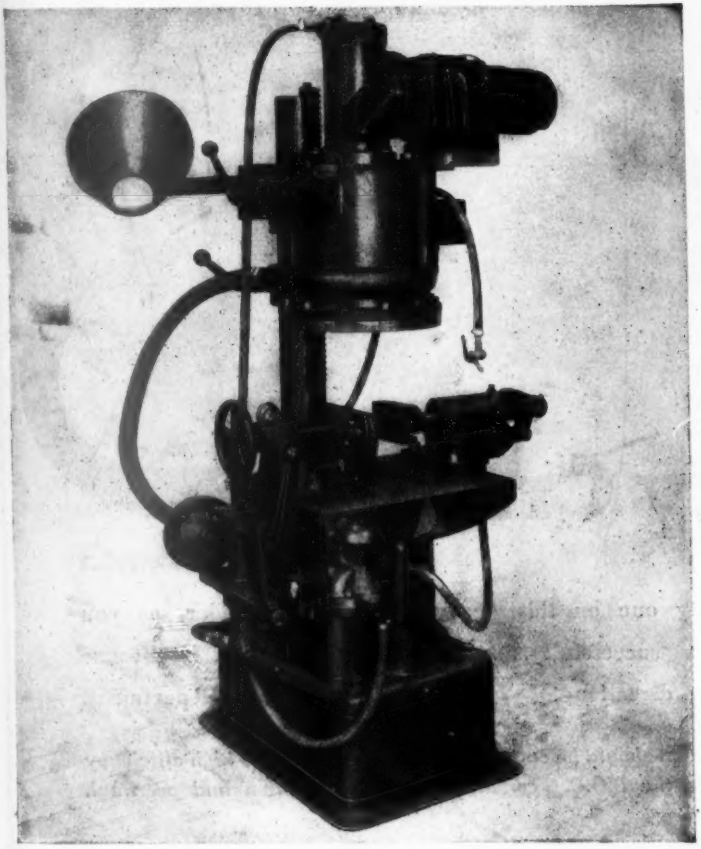


CARBORUNDUM HARDEST AND SHARPEST REG° TRADE MARK MANCHESTER

THE CARBORUNDUM COMPANY LTD.
TRAFFORD PARK :: MANCHESTER

TITAN CORE MACHINES

are daily solving new core-making problems and removing bottle-necks in war production



Saving in Skilled Labour. A girl can operate the Titan machine. Intricate cores may be blown in one operation (one movement of the hand lever).

Faster Output. Up to tenfold increase over hand methods.

Better Cores of uniform quality, greater strength and maximum permeability.

The machine illustrated is fitted with a sand container of 75 lbs. capacity (which can be re-charged in a couple of minutes) motor-driven sand agitator and automatic compressed air horizontal clamp. This machine takes boxes up to 20 ins. long by 12 in. wide by 24 in. high without removing the clamps.

EARLY DELIVERY

Provided motors for standard current are required, we can offer early delivery of machines of the above type for work of certified priority.

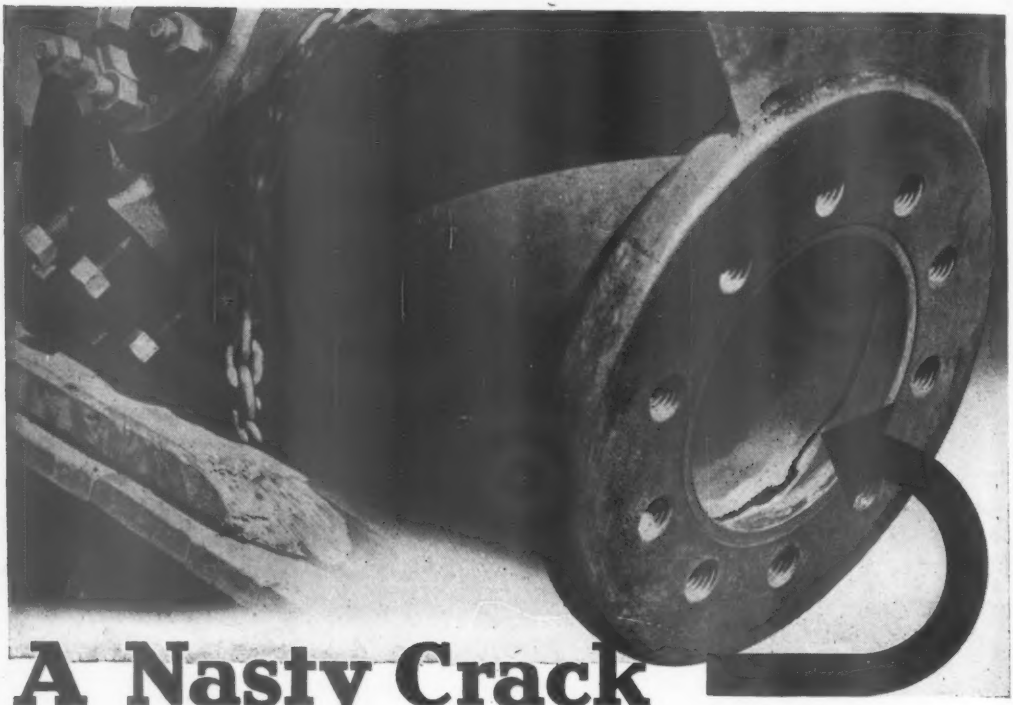
Ask for Folder 204

THE CONSTRUCTIONAL ENGINEERING Co LTD

Telephone: MID 4753-4

TITAN WORKS BIRMINGHAM, 12

Telegrams: "Structural Birmingham"



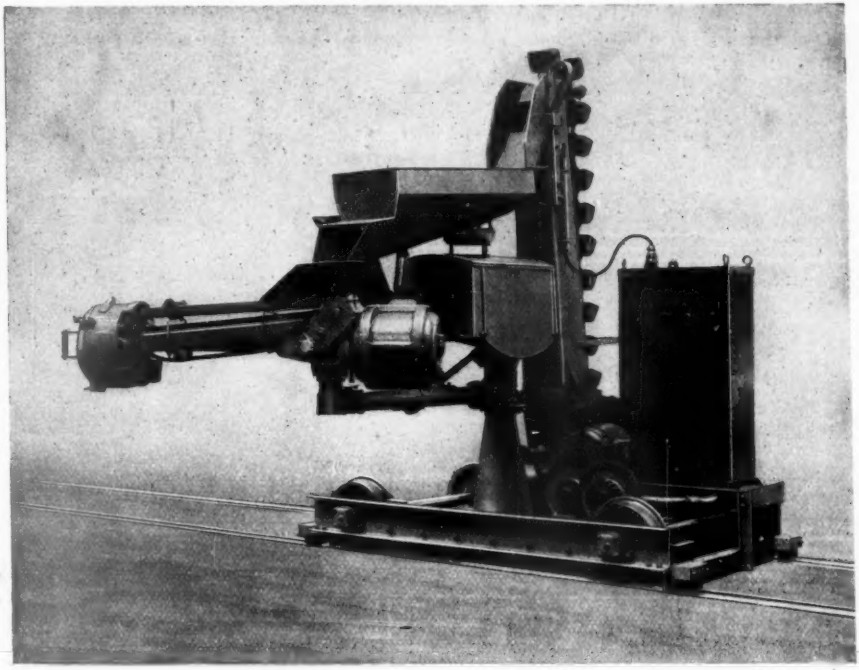
A Nasty Crack

A particularly nasty one on this heavy compressor cylinder, as you can see. But it was successfully and economically repaired by Bronze welding under the direction of our Technical Service Department.

Oxy-Acetylene equipment should be carefully maintained to retain high efficiency and should be sent to the B.O.C. periodically for examination and overhaul.

THE BRITISH OXYGEN COMPANY LIMITED

LONDON & BOC BRANCHES



Express Ramming in the Jobbing Foundry

Sandslinger designs embody our twenty-five years practical experience of Sandslinger operation in all classes of foundries.

Reserve your Craftsmen for really skilled work. Let the Sandslinger do the 'donkey' work of ramming large volumes of sand.

FOUNDRY PLANT & MACHINERY LTD.

113, WEST REGENT STREET, GLASGOW.

ROUND OAK STEEL WORKS LTD.

BRIERLEY HILL STAFFS.

TELEPHONE : BRIERLEY HILL 7231 (7 lines) TELEGRAMS : "DUD" OR "EDROW," BRIERLEY HILL.

COLD BLAST PIG IRON

BRAND
"DUD. L.N.F'ces. DUD."

THE WORLD'S BEST

MOLINEUX

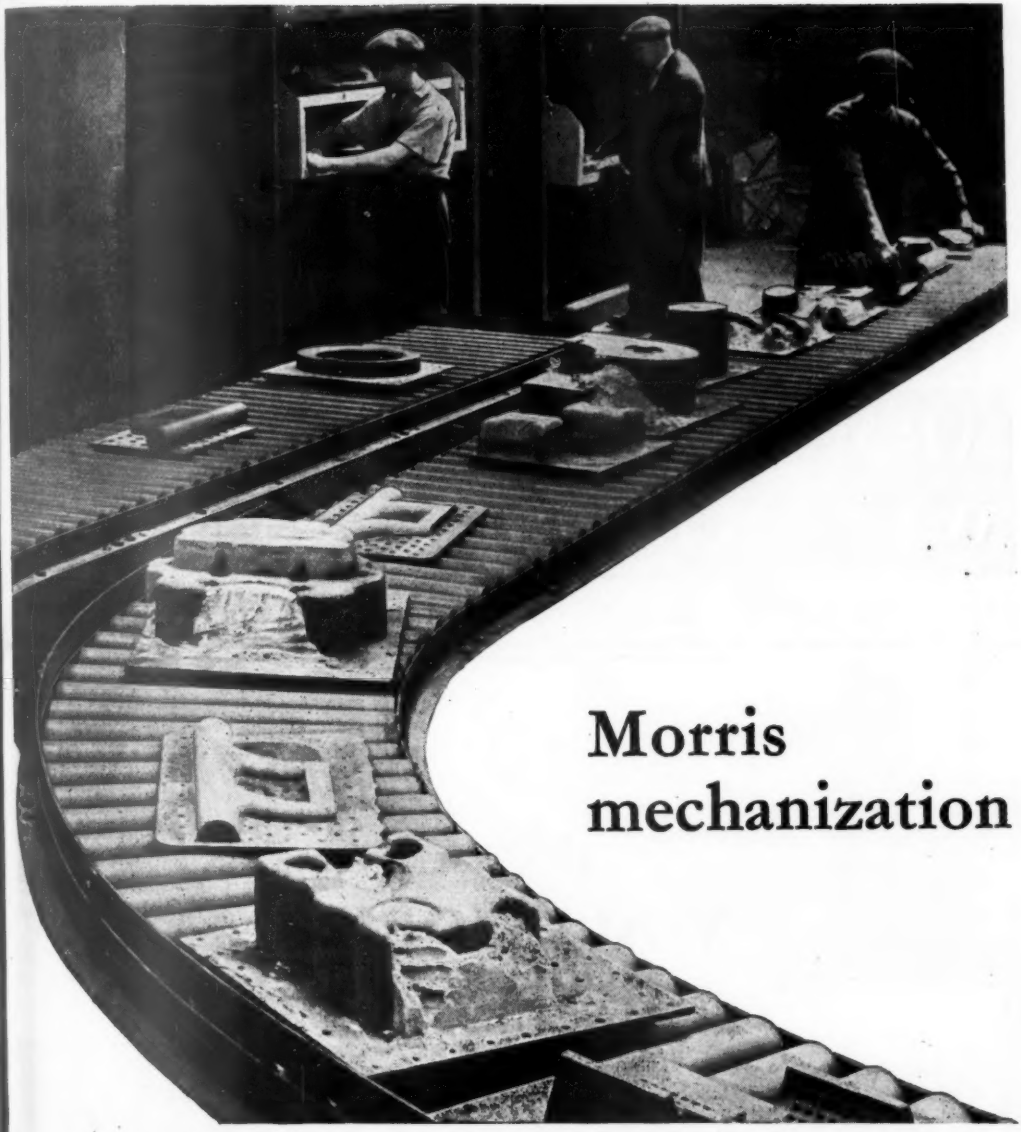
CORETTE

FOR THE RAPID PRODUCTION OF SMALL CORES

SIMPLE AND INEXPENSIVE. WITHIN ITS CAPACITY DEFINITELY FASTER THAN MOST ELABORATE MACHINES.

MOLINEUX
FOUNDRY EQUIPMENT LIMITED

MARLBOROUGH ROAD · LONDON · N.19
Phone: ARCHWAY 4128 (2 lines)



Morris
mechanization

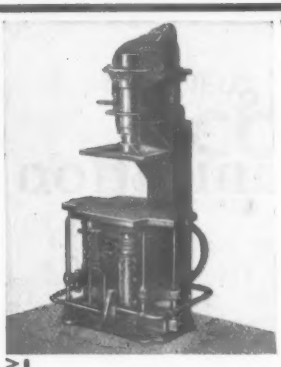
Herbert Morris Ltd. Loughborough England

PNEUMATIC CHIPPER

ARMSTRONG WHITWORTH

ARMSTRONG WHITWORTH & CO. (PNEUMATIC TOOLS) LTD. CLOSE WORKS GATESHEAD-ON-TYNE

W.T. 562 TURN OVER



SPEED and precision . . .

WALLWORK MOULDING MACHINES

GIVE YOU BOTH . . . . . .

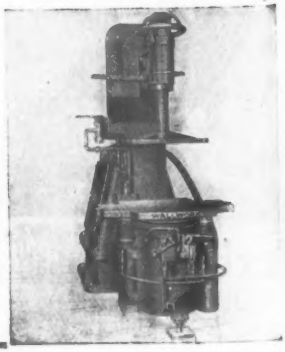
WRITE FOR COMPREHENSIVE CATALOGUE AND BULLETIN No. 1 "A Guide to Machine Moulding"

WALLWORK GEARS LIMITED.

Foundry Equipment & Mechanical Handling Dept.

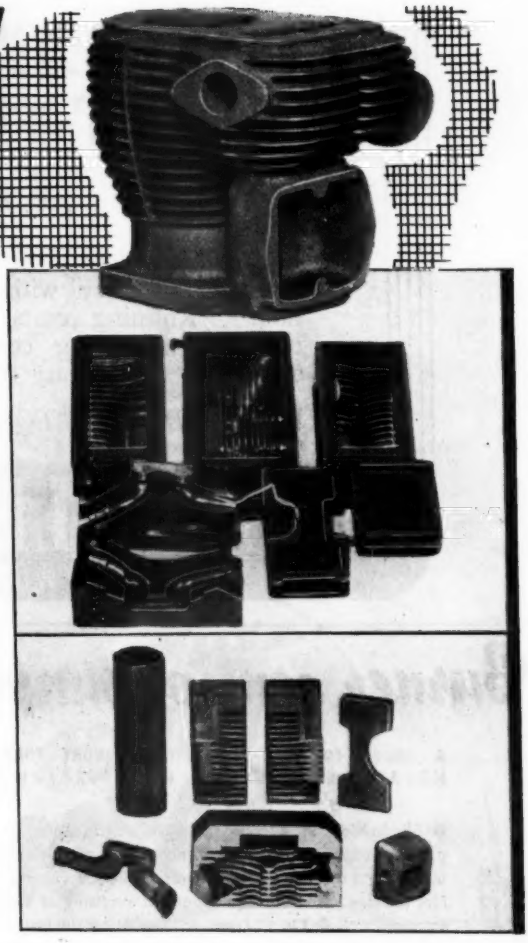
157, VICTORIA STREET, LONDON, S.W.1

WORKS: MANCHESTER. Phone & Grams: Victoria 0482 - 3



W.T. 563 STRAIGHT DRAW

Control



The manufacture of air cooled automobile Cylinders is a branch of Foundry work at once fascinating and very exacting in respect to proper treatment. Castings are relatively small in size and intricate in design and on account of the Fin structure, moulds are extremely delicate in the green state.

At every stage of production, from the preparation of perfect working Patterns to methods of gating and casting, the need for close control is ever present.

Intermediate between those stages the control of moulding and core sand mixtures is paramount and vital. Suitable sands are carefully selected and the bonding agents balanced in a manner to give the necessary properties of plasticity, flowability and rigidity. Any suggestion of tackiness in the sand mixtures is fatal to efficient working.

Cores and moulds must be responsive to contraction in castings with extremely thin wall sections in order to avoid cracking, and, at the same time, must be sufficiently robust to withstand handling and assembling.

The photos show an assortment of castings together with some specimen cores and the core boxes employed.

The moulds and cores for these castings are made with sand mixtures consisting of Kordek and Linseed Oil skilfully regulated to obtain the necessary first class results.

(Photos by courtesy of Idoson Motor Cylinder Co., Ltd.)

KORDEK Binders
KORDEK GB KORDEK GB KORDOL
FOR ALL CLASSES OF WORK
CORN PRODUCTS COMPANY LIMITED, AVON HOUSE, 356, OXFORD STREET, LONDON, W. 1.

COMPLETE PLANT FOR DRYING *At Low Cost*

Edgar Allen complete drying plants combine high thermal efficiency with simple and robust construction. Running costs are low. Many classes of materials are being commercially dried by this type of dryer. Auxiliary equipment also manufactured.

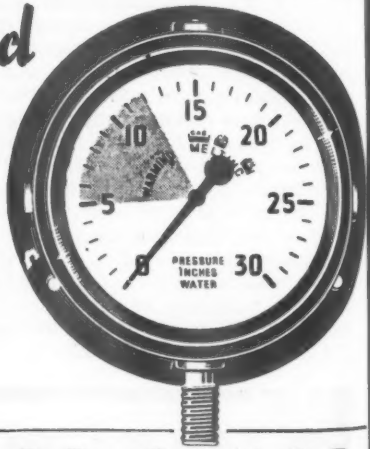
● *Write for DRYING EQUIPMENT BOOKLET.*

EDGAR ALLEN & CO. LTD.
IMPERIAL STEEL WORKS SHEFFIELD·9

Burner control simplified

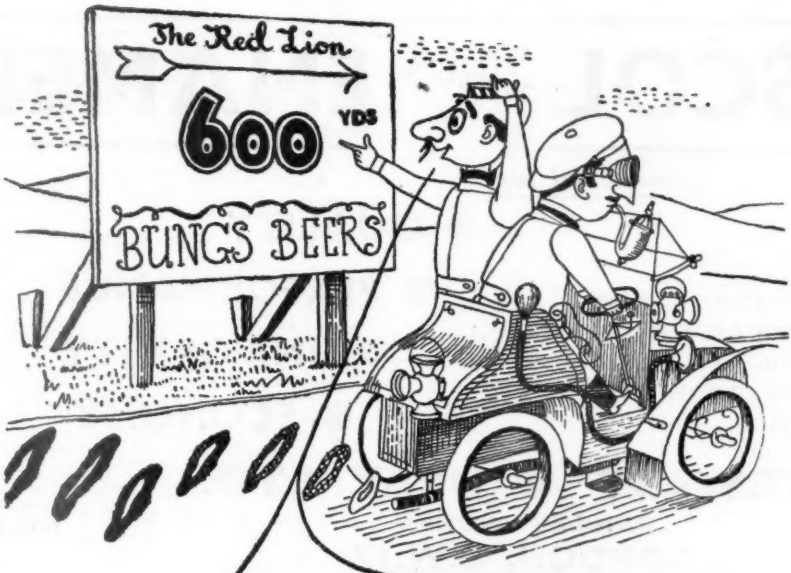
A GAUGE FOR ALL TYPES OF FOUNDRY FURNACES, METAL MELTING AND HEAT TREATMENT.

● Elimination of guesswork with visual control of air pressure supply to burner. ● Promotion of efficient combustion and therefore correct melting time. ● Prevention of fuel wastage. ● Assists judgment of oxidising or reducing atmospheres. ● On all types of installation the instrument helps the user to obtain the best life from refractories and crucibles. ● Standard dial ranges:—0-12 ins., 0-18 ins., 0-30 ins., 0-50 ins., 0-100 ins. water pressure. ● Vacuum ranges on request.



PRESSURE SENSITIVE K.D.G.

AIR PRESSURE GAUGE
for a wide range of Oil & Gas Burners
Also manufacturers of Hydrostatic Liquid Contents Gauges, Float-operated Switches for level control and signalling systems, Pressure Gauges of all types
K.D.G. INSTRUMENTS LTD. · PURLEY WAY · CROYDON *Uplands 688*



AH! THAT REMINDS ME— GEORGE COHEN'S BUY SCRAP

ONE OF THE 600 GROUP OF COMPANIES

GEORGE COHEN, SONS & CO, LTD.

Scrap Merchants since 1834 · Broadway Chambers, Hammersmith, London W.6 (*Riverside* 4141) . Quadrant Street, Canning Town, E.16 (*Albert Dock* 3104) 600 Commercial Road, E.14 (*Stepney Green* 3434). And at : Sheffield, Birmingham, Manchester, Newcastle-on-Tyne, Belfast, Swansea, etc.

456/x22

ESCOL VITREOUS ENAMELS

Unexcelled for

- QUALITY
- PERFORMANCE
- UNIFORMITY
- ECONOMY

EXPERIENCE AND TECHNICAL ASSISTANCE ON ALL ENAMELLING PROBLEMS AT YOUR SERVICE!

STEWART & GRAY LTD.
PAISLEY WORKS,
LONDON, S.W.17

Telephone:
MIT.1634

0"–2½"

this is the fuel size range of the STROUD—the Under-feed Stoker with the Mechanical RAM—for Stoves and Furnaces.

STROUD STOKERS LIMITED STROUD GLOS

FOUNDRY TRADE JOURNAL
Established 1903
WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

49, Wellington Street, London, W.C.2.
'Grams: "Zacatecas, Rand, London."
'Phone: Temple Bar 3951 (Private Branch Exchange).
PUBLISHED WEEKLY: 21s. per annum Home and Overseas).

OFFICIAL ORGAN OF:

COUNCIL OF IRONFOUNDRY ASSOCIATIONS

Chairman: FitzHerbert Wright, c/o Aveling-Barford, Limited, Invicta Works, Lincs. Secretary: T. E. Parkinson, Derbyshire House, Belgrove Street, King's Cross, London, W.C.1.

Participating Associations: British Bath Manufacturers' Association; British Ironfounders' Association; British Malleable Tube Fittings Association; Cast Iron Axlebox Association; Cast Iron Chair Association; Cast Iron Heating, Boiler and Radiator Manufacturers' Association; Cast Iron Pipe Association; Cast Iron Segment Association; Greensand Pipe Founders' Association of Scotland; Ironfounders' National Confederation; National Association of Malleable Ironfounders; National Ingot Mould Association; National Ironfounding Employers' Federation; Association of Automobile and Allied High Duty Ironfounders; British Cast Iron Research Association (affiliated); British Grit Association (affiliated); Flushing Cistern Makers' Association (affiliated); Institute of British Foundrymen (affiliated).

INSTITUTE OF BRITISH FOUNDRYMEN

PRESIDENT, 1945-46: John W. Gardom, M.Cons.E., A.M.I.Mech.E., Ripley, Derbyshire.

General Secretary: T. Makemson. Acting Secretary: J. Bolton, Saint John Street Chambers, Deansgate, Manchester 3.

BRANCHES:

Birmingham, Coventry and West Midlands: A. A. Timmins, F.R.I.C. 33, Carters Lane, Quinton. Bristol and West of England: A. Hares, 648, Stapleton Road, Bristol, 5. E. Midlands: S. A. Horton, "Three," Mostyn Avenue, Littleover, Derby. Lancs: H. Buckley, Ellesmere, Norfolk Avenue, Burnley. London: F. Arnold Wilson, Wm. Jacks & Co., Ltd., Winchester House, Old Broad Street, London, E.C.2. Middlesbrough (*pro tem.*): J. K. Smithson, North-Eastern Iron Refining Company, Limited, Stillington, Stockton-on-Tees. Newcastle-upon-Tyne: C. Lashly, M.C., Sir W. G. Armstrong, Whitworth & Co., (Ironfounders), Ltd., Close Works, Gateshead. Scottish: J. Bell, 60, St. Enoch Square, Glasgow. Sheffield: T. R. Walker, M.A., English Steel Corporation, Ltd., Sheffield. Wales and Monmouth: A. S. Wall, 14, Palace Avenue, Llandaff, Cardiff. West Riding of Yorkshire: G. H. Pollard, I, Tudor Street, Manchester Road, Bradford South Africa: Secretaries, S.A.F.E.M.A., Barclays Bank Buildings, Cr. Commissioner and Harrison Streets, Johannesburg.

SECTIONS:

Burnley: H. Buckley, Ellesmere, Norfolk Avenue, Burnley, Lancs. Cape Town: K. Zwanziger, P.O. Box 346, Cape Town, S. Africa. East Anglian: A. N. Sumner, 516, Norwich Road, Ipswich. Falkirk: T. R. Goodwin, "Viewfield," Falkirk Road, Bonnybridge. Lincoln: E. R. Walter, Ph.D., The Technical College, Lincoln. Slough: John Pike Encombe Cottage, Fairfield Lane, Farnham Royal, Bucks.

ASSOCIATION OF BRONZE AND BRASS FOUNDERS

President: G. T. Hyslop, Phosphor Bronze Co., Ltd., Birmingham. Secretaries: Heathcote & Coleman, 25, Bennetts Hill, Birmingham 2

THE INSTITUTE OF VITREOUS ENAMELLERS

President: John W. Gardom, Ripley, near Derby. Chairman W. S. Grainger, Stocal Enamels, Limited, Burton-on-Trent. Hon. Sec.: W. Thomas, F.I.C., Ricksmansworth Road, Chorleywood, Herts.

FOUNDRY TRADES' EQUIPMENT AND SUPPLIES ASSOCIATION

President: D. Cherry Paterson, M.I.Mech.E., Bedford House, Bedford Street, Strand, London, W.C.2. Secretaries: Peat, Marwick, Mitchell & Company, 94/98, Petty France, London, S.W.1.

WELSH ENGINEERS' AND FOUNDERS' ASSOCIATION

President: W. E. Clement, C.B.E., Morfa Foundry, New Dock, Llanelly. Secretary: J. D. D. Davis, 1, St. James Gardens, Swansea.

BRITISH CAST IRON RESEARCH ASSOCIATION

Alvechurch, Birmingham. 'Phone and 'Grams: Redditch 716.
Scottish Laboratories:—Foundry Technical Institute, Meek's Road, Falkirk. ('Phone: 332.)

INDEX TO ADVERTISERS

	Page No.
Albion (Mansfield) Sand Co.	1
Allen, Alfred, & Son, Ltd.	30
Allen, Edgar, & Co., Ltd.	10
Aluminium Union, Ltd.	31
Anglardia, Ltd.	27
Armstrong Whitworth, Sir W. G., & Co., Ironfounders, Ltd.	8
August's, Ltd.	14
Baldwin Instrument Co. Ltd.	20
British Moulding Machine Co., Ltd.	1
British Oxygen Co., Ltd.	4
British "Rema" Manufacturing Co., Ltd.	10
Butcher, Hy., & Co.	28
Butterworth Bros., Ltd.	26
Carborundum Co., Ltd.	2
Cohen, Geo., Sons, & Co., Ltd.	11 & 18
Constructional Eng. Co., Ltd., The	3
Corn Products, Ltd.	9
Cumming, Wm., & Co., Ltd.	26
Durrans, James, & Sons, Ltd.	28
Easton & Johnson, Ltd.	30
Electrogenerators, Ltd.	18
Ether, Ltd.	26
Eyre Smelting Co., Ltd.	22
Foundry Plant & Machinery, Ltd.	5
Foundry Services, Ltd.	30
Fuller's Earth Union, Ltd., The	19
Gadd, Thos.	22
General Refractories, Ltd.	385
General Electric Co., Ltd., The	29
Harper, Wm., Son, & Co. (Willenhall), Ltd.	26
Jacks, William, & Co., Ltd.	17
K.D.G. Instruments, Ltd.	10
King Bros. (Stourbridge), Ltd.	22
King, Geo. W., Ltd.	25
Lavino (London), Ltd.	32
Lees Hall & Sons, Ltd.	25
Levy, B., & Co.	19
Luke & Spencer, Ltd.	32
Ministry of Fuel and Power	21
Molineux Foundry Equipment Co., Ltd.	6
Morgan Crucible Co., Ltd.	33
Morris, Herbert, Ltd.	7
Pattern Makers (Eng.) Co., Ltd.	20
Perry, G., & Sons	20
Petromor, Ltd.	27
Pickford Holland & Co., Ltd.	20
Pneulec, Ltd.	1
Price, J. T., & Co., Ltd.	1
Ransomes, Sims, & Jefferies, Ltd.	22
Robinson, T. W. S., & Co.	19
Roper, E. A., & Co.	27
Round Oak Steel Works, Ltd.	6
Rowland, F. E., & Co., Ltd.	23
St. George's Engineers, Ltd.	19
Sklenar Patent Melting Furnaces Co., Ltd.	30
Smedley Bros., Ltd.	30
Spencer & Halstead, Ltd.	31
Stanton Ironworks Co., Ltd., The	381
Staveley Coal & Iron Co., Ltd.	28
Sterling Foundry Specialties, Ltd.	1
Sternol Ltd.	15
Stewart & Gray, Ltd.	12
Stroud Stokers, Ltd.	12
Teisen, Th.	1 & 15
Walker, I. & I.	34
Wallwork Gears, Ltd.	8
Walsall Sandblasting Co., Ltd., The	20
Ward, Thos. W., Ltd.	1, 18 & 383
Waring Bros.	27
Watsons (Metallurgists), Ltd.	24
West Midland Refining Co., Ltd.	24

YORKSHIRE — MOULDER *of* CHARACTER

Sounding Brass

IN small wayside houses, strong wordless men put aside the evening paper, and prepare for practice night. A bandsman lives in every street, as all his neighbours know. But he plays as softly as maybe, studying his score for the coming contest.

Brass bands were surely born in Yorkshire, and for sheer masculinity in music, for excellence in phrasing, and finely concerted effort, few artisan musicians anywhere can equal them.

A harassed conductor once asked a total stranger if he could play a B-flat Bass. "Ee aw dooan't knaw," said the stranger, "Ahve nivver tried. How flat wod ya want it?"

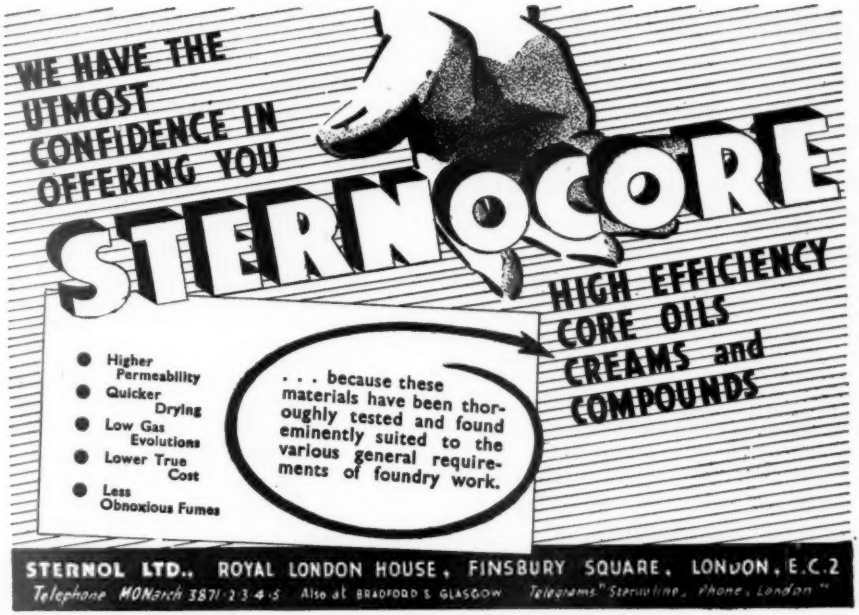
DIFFICULTIES NEVER MATTER MUCH IN YORKSHIRE. AS AUGUST'S CAN TESTIFY, — THEY ARE THERE ONLY TO BE MASTERED.

Sole Licensees and Manufacturers for British Empire (excluding Canada) of the Simpson Sand Mixer.

August's LIMITED

SPECIALISTS IN FOUNDRY MECHANISATION

Telephone: 61247/8 HALIFAX · ENGLAND Telegrams: August's, Halifax


WE HAVE THE UTMOST CONFIDENCE IN OFFERING YOU
STERNOCORE
HIGH EFFICIENCY CORE OILS CREAMS and COMPOUNDS
Higher Permeability
Quicker Drying
Low Gas Evolutions
Lower True Cost
Less Obnoxious Fumes
. . . because these materials have been thoroughly tested and found eminently suited to the various general requirements of foundry work.
STERNOL LTD., ROYAL LONDON HOUSE, FINSBURY SQUARE, LONDON, E.C.2
Telephone MONarch 3871-2-3-4-5 Also at BRADFORD & GLASGOW Telegrams "Sterniline, Phone, London"

TEISEN

NEW CONTINUOUS ENAMELLING FURNACES
STRAIGHT THROUGH AND "U" TYPES
HIGH POWER RECUPERATIVE MUFFLES
AIR HEATERS AND DRYING OVENS
ROTARY MELTING FURNACES
NEW WORKS PLANNED

CONTACT THE FURNACE SPECIALISTS

TH. TEISEN C:E

FURNACE ENGINEER

ECKERSALL ROAD, KING'S NORTON, BIRMINGHAM

PHONE: KING'S NORTON 2277 *GRAMS: 'TETE' BIRMINGHAM*

CURRENT PRICES OF IRON, STEEL AND NON-FERROUS METALS

(Delivered, unless otherwise stated)

Wednesday, December 26, 1945

PIG-IRON

Foundry Iron.—CLEVELAND No. 3: Middlesbrough, 143s.; Birmingham, 145s.; Falkirk, 143s.; Glasgow, 146s.; Manchester, 148s. DERBYSHIRE No. 3: Birmingham, 145s.; Manchester, 148s.; Sheffield, 142s. 6d. NORTHANTS No. 3: Birmingham, 142s. 6d.; Manchester, 146s. 6d. STAFFS No. 3: Birmingham, 145s.; Manchester, 148. LINCOLNSHIRE No. 3: Sheffield, 142s. 6d.; Birmingham, 145s.

(*No. 1 foundry 3s. above No. 3. No. 4 forge 1s. below No 3 for foundries, 3s. below for ironworks.*)

Hematite.—Si up to 2.25 per cent., S & P over 0.03 to 0.05 per cent.: Scotland, N.-E. Coast and West Coast of England, 153s. 6d.; Sheffield, 159s.; Birmingham, 165s.; Wales Welsh iron), 149s.; East Coast No. 3 at Birmingham, 164s.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, 155s. 6d., delivered Birmingham.

Scotch Iron.—No. 3 foundry, 139s. 9d.; No. 1 foundry, 142s. 3d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, 180s.; South Zone, 182s. 6d.

Refined Malleable.—North Zone, 190s.; South Zone, 192s. 6d.

Cold Blast.—South Staffs, 242s. 6d.

(NOTE.—*Prices of hematite pig-iron, and of foundry and forge iron with a phosphoric content of not less than 0.75 per cent., are subject to a rebate of 5s. per ton.*)

FERRO-ALLOYS

(Per ton unless otherwise stated, basis 2-ton lots, d/d Sheffield works.)

Ferro-silicon (5-ton lots).—25 per cent., £21 5s.; 45 per cent., £25 10s.; 75 per cent., £39 10s. Briquettes, £30 per ton.

Ferro-vanadium.—35/50 per cent., 15s. 6d. per lb. of V.

Ferro-molybdenum.—70/75 per cent., carbon-free, 5s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, 1s. 3½d. lb.

Ferro-tungsten.—80/85 per cent., 6s. 10d. lb.

Tungsten Metal Powder.—98/99 per cent., 7s. 4½d. lb.

Ferro-chrome.—4/8 per cent. C, £46 10s.; max. 2 per cent. C, 1s. 3½d. lb.; max. 1 per cent. C, 1s. 4½d. lb.; max. 0.5 per cent. C, 1s. 5d. lb.

Cobalt.—98/99 per cent., 8s. 9d. lb.

Metallic Chromium.—96/98 per cent., 4s. 9d. lb.

Ferro-manganese.—78/98 per cent., £18 10s.

Metallic Manganese.—94/96 per cent., carb.-free, 1s. 9d. lb.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms and Slabs.—BASIC: Soft, u.t., 100-ton lots, £12 5s.; tested up to 0.25 per cent. C, £12 10s.; hard (0.42 to 0.60 per cent. C), £13 17s. 6d.; silico-manganese, £17 5s., free-cutting, £14 10s. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £15 15s.; case-hardening, £16 12s. 6d.; silico-manganese, £17 5s.

Billets, Blooms and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £13 17s. 6d.; basic hard, 0.42 to 0.60 per cent. C, £14 10s.; acid, up to 0.25 per cent. C, £16 5s.

Sheet and Tinplate Bars.—£12 2s. 6d., 6-ton lots.

FINISHED STEEL

[*A rebate of 15s. per ton for steel bars, sections, plates, joists and hoops is obtainable in the home trade under certain conditions.*]

Plates and Sections.—Plates, ship (N.-E. Coast), £16 3s.; boiler plates (N.-E. Coast), £17 0s. 6d.; chequer plates (N.-E. Coast), £17 13s.; angles, over 4 un. ins., £15 8s.; tees, over 4 un. ins., £16 8s.; joists, 3 in. × 3 in. and up, £15 8s.

Bars, Sheets, etc.—Rounds and squares, 3 in. to 5½ in., £16 18s.; rounds, under 3 in. to ⅝ in. (untested), £17 12s.; flats, over 5 in. wide, £15 13s.; flats, 5 in. wide and under, £17 12s.; rails, heavy, f.o.t., £14 10s. 6d.; hoops, £18 7s.; black sheets, 24 g. (4-ton lots), £22 15s.; galvanised corrugated sheets (4-ton lots), £26 2s. 6d.

Tinplates.—I.C. cokes, 20 × 14 per box, 29s. 9d. f.o.t. makers' works, 30s. 9d. f.o.b.; C.W., 20 × 14, 27s. 9d. f.o.t., 28s. 6d. f.o.b.

NON-FERROUS METALS

Copper. — Electrolytic, £62; high-grade fire-refined, £61 10s.; fire-refined of not less than 99.7 per cent., £61; ditto, 99.2 per cent., £60 10s.; black hot-rolled wire rods, £66 10s.

Tin.—99 to under 99.75 per cent., £300; 99.75 to under 99.9 per cent., £301 10s.; min. 99.9 per cent., £303 10s.

Spelter.—G.O.B. (foreign) (duty paid), £31 5s.; ditto (domestic), £32; "Prime Western," £32; refined and electrolytic, £32 15s.; not less than 99.99 per cent., £34 5s.

Lead.—Good soft pig-lead (foreign) (duty paid), £30; ditto (Empire and domestic), £30; "English," £31 10s.

Zinc Sheets, etc.—Sheets, 10g. and thicker, ex works, £43 2s. 6d.; rolled zinc (boiler plates), ex works, £41 2s. 6d.; zinc oxide (Red Seal), d/d buyers' premises, £36 5s.

Other Metals.—Aluminium, ingots, £85; antimony, English, 99 per cent., £105; quicksilver, ex warehouse, £30 10s. to £31 5s.; nickel, £190 to £195.

Brass.—Solid-drawn tubes, 13½d. per lb.; brazed tubes, 16½d.; rods, drawn, 11½d.; rods, extruded or rolled, 9d.; sheets to 10 w.g., 10½d.; wire, 11d.; rolled metal, 9½d.; yellow metal rods, 9d.

Copper Tubes, etc.—Solid-drawn tubes, 13d. per lb.; brazed tubes, 13d.; wire, 10½d.

Phosphor Bronze.—Strip, 14½d. per lb.; sheets to 10 w.g., 15½d.; wire, 16½d.; rods, 15½d.; tubes, 20d.; castings, 20d., delivery 3 cwt. free. 10 per cent. phos. cop., £35 above B.S.; 15 per cent. phos. cop. £43 above B.S.; phosphor tin (5 per cent.), £40 above price of English ingots. (C. CLIFFORD & SON, LIMITED.)

Nickel Silver, etc.—Ingots for raising, 10d. to 1s. 4d. per lb.; rolled to 9 in. wide, 1s. 4d. to 1s. 10d.; to 12 in. wide, 1s. 4½d. to 1s. 10½d.; to 15 in. wide, 1s. 4½d. to 1s. 10½d.; to 18 in. wide, 1s. 5d. to 1s. 11d.; to 21 in. wide, 1s. 5½d. to 1s. 11½d.; to 25 in. wide, 1s. 6d. to 2s. Ingots for spoons and forks, 10d. to 1s. 6½d. Ingots rolled to spoon size, 1s. 1d. to 1s. 9½d. Wire, round, to 10g., 1s. 7½d. to 2s. 2½d., with extras according to gauge. Special 5ths quality turning rods in straight lengths, 1s. 6½d. upwards.

COMPANY RESULTS

(Figures for previous year in brackets)

A. E. Jenks & Cattell—Net profit, £26,796 (£22,758); dividend of 10%, tax free (same); forward, £59,921 (£46,050).

Bulls Metal & Melloid—Net profit to September 30, £21,132 (£21,478); dividend of 10% (5%); forward, £18,138 (£14,179).

Dennis Bros.—Net profit for the year ended September 30, £125,492 (£125,889); dividend of 1s. 3d. per share; forward, £181,134 (£177,547).

Gascoignes (Reading)—Net trading profit to October 31 last, £11,801 (£20,349); taxation, £5,000 (£10,500); dividend of 12½% (15%).

John Holroyd & Company—Net profit for the year ended September 30, £22,298 (£23,493); dividend of 20% (same); forward, £58,518 (£51,220).

Hepworth & Grandage—Net profit for the year ending September 30 last, £44,825 (£49,622); dividend of 15% (12½%); forward, £17,319 (£18,244).

Brett's Stamping—Net profit, £15,584 (£15,249); dividend of 25% (same); to taxation reserve, nil (£7,000); to general reserve, £5,000 (nil); forward, £14,620 (£12,136).

Atlas Steel Foundry & Engineering—Net profit for the year ended September 30, £24,918 (£29,576); interim dividend of 3s. per share, less tax, £8,437; final dividend of 3s. 6d. per share and bonus of 2s. per share, less tax, £15,469; forward, £9,014 (£8,002).

Wolverhampton Die-Casting Company—Net trading profit for the year ended June 30, £27,411; taxation reserves not now required, £3,356; depreciation, £6,757; reserve for income-tax, £21,555; net profit, £2,456 (£10,683); ordinary dividend of 12½% (same); forward, £23,998 (£24,437).

Universal Grinding Wheel—Net profit for the year ended September 29, after E.P.T., income-tax, and depreciation, £73,646 (£66,820); participating dividend on the preference shares of 2% (same); ordinary dividend of 15% (10%), free of tax; to reserve, £25,000 (same); forward, £32,482 (£27,836).

Geo. Turton Platts & Company—Profit for the year ended March 31, £38,403 (£33,938); special depreciation, £2,500 (£7,500); deferred repairs, £12,000 (nil); contingencies, nil (£5,000); final dividend of 12½% (10%), making 20% (17½%), plus 10% (same) bonus; forward, £27,527 (£26,045).

E. G. Brown—Trading profit to September 30 last, £150,185 (£250,196); other income, £7,497 (£7,496); depreciation, £10,386 (£10,080); taxation, including E.P.T., £114,000 (£220,000); deferred repairs, £11,000 (nil); to general reserve, nil (£1,000); dividend of 20% (same); forward, £14,378 (£16,949).

A ROAD AND RAILWAY BRIDGE across the River Tigris at Baghdad is to be built by Balfour, Beatty & Company, Limited, engineers, at a cost of £2,000,000.

PIG-IRON

LOW PHOSPHORUS · REFINED & CYLINDER · HIGH DUTY
MALLEABLE · DERBYSHIRE · NORTHAMPTONSHIRE

WILLIAM JACKS & CO. LTD. LONDON E.C.2

WINCHESTER HOUSE · OLD BROAD STREET · London Wall 4774 (6 LINES)

NON-FERROUS METALS & SCRAP

REGISTERED TRADE MARK LIMPET

FERRO-SILICON FERRO-ALLOYS BRIQUETTES

AND AT BIRMINGHAM, 2
39 CORPORATION STREET
Midland 3375-6

LIVERPOOL, 2
13 RUMFORD STREET
Central 1558

GLASGOW, C.2
93 HOPE STREET
Central 9969

SMALL ADVERTISEMENTS

IMPORTANT

None of the vacancies in these columns relates to a man between the ages of 18 and 30 (inclusive) unless he is excepted from the provisions of the Control of Engagement Order, 1945, or the vacancy is for employment excepted from the provisions of that Order.

SITUATIONS

WORKS Executive, M.I.B.F., with many years' experience in all processes of the light castings industry for the building trades, rainwater, soil, drain, baths, sanitary and structural castings (mechanised plant), wishes to contact firm or one contemplating commencing business, where his experience in a managerial or administrative capacity would be mutually advantageous.—Box 804, FOUNDRY TRADE JOURNAL, 49, Wellington Street, London, W.C.2.

METALLURGIST (30) desires change, or position as Foundry Manager or Assistant; good general knowledge of metallurgy and practice of iron and steel melting, including cupola control, converters, electric furnaces, sand conditioning, heat treatment; 12 years' experience in mechanised foundries, with latest mass production methods; keen organiser, tactful, energetic.—Box 784, FOUNDRY TRADE JOURNAL, 49, Wellington Street, London, W.C.2.

WORKS MANAGER, age 30 to 36, required for the Midland foundry and engineering works of a progressive Company; sound practical experience in the manufacture and casting of special irons and alloy steels and in the control of personnel is essential; a knowledge of machine shop practice is desirable; the position calls for tact and energy; it provides scope for improved results; applicants are requested to give (in strict confidence) full particulars of their technical qualifications and practical experience, references, age, and salary required.—Box 86, c/o Pool's, Aldwych House, London, W.C.2.

NORTHERN IRONFOUNDRY requires Young Engineers; conversant with metal and sand centrifugal casting, also general management; good opportunity to become Works General Manager.—Write Box 828, FOUNDRY TRADE JOURNAL, 49, Wellington Street, London, W.C.2.

EMPLOYMENT REGISTER.

Correspondence should be addressed to the General Secretary, Institute of British Foundrymen, St. John Street Chambers, Deansgate, Manchester, from whom full particulars can be obtained of this service.

FOUNDRY FOREMAN (34) desires change; fully experienced, pattern-making, modern foundry practice, grey iron and high duty iron, sand control, cupola control; keen disciplinarian. (492)

YOUNG Man, A.M.I.B.F., seeks position as Assistant Foundry Manager; practical and technical training; mass production, sand, and labour control, etc.; City and Guilds certificate. (493)

FOUNDRY FOREMAN wanted for foundry making general engineering castings up to 3 tons each, and non-ferrous up to 300 lbs. each; must have good knowledge of production methods, and be a good disciplinarian.—Apply, giving full details of training, present position, and salary required; good scope for an energetic, enthusiastic man; works situated one hour train North of London.—Box 836, FOUNDRY TRADE JOURNAL, 49, Wellington Street, London, W.C.2.

AGENCY

LONDON REPRESENTATION MANUFACTURERS, producing Steel or Malleable Castings or components for MOTOR and GENERAL ENGINEERING TRADES, and wishing for INCREASED TURNOVER in the LONDON and HOME COUNTIES, should communicate with a firm of OLD-ESTABLISHED ENGINEERS' AGENTS, with a CENTRAL LONDON OFFICE and TECHNICAL STAFF, who can now accommodate an ADDITIONAL AGENCY. PAYMENT BY RESULTS.—Write Box 818, FOUNDRY TRADE JOURNAL, 49, Wellington Street, London, W.C.2.

FOR SALE

OLD-ESTABLISHED concern of Engineers and Iron Founders, considering rationalisation of production, is contemplating discontinuance of section of the business producing in normal times builders', merchants' castings, and sundry general work, including considerable quantities of stoves and garden rollers, and will have for disposal patterns and goodwill.—Interested persons or concerns are invited to write to Box 812, FOUNDRY TRADE JOURNAL, 49, Wellington Street, London, W.C.2.

MACHINERY

FOR SALE.—Roll Tooth Crusher, by Herbert Alexander; feed, 12 in. by 18 in.; suitable large coke, barytes, etc.; h.p., 8 to 10. Hammer Mill, by British Jeffrey Diamond; feed, 8 in. by 8 in.; h.p., 4 to 6; revs. 1,800; crushing, 4-in. cubes to maximum ¼ in.; output, 12 to 16 cwts. per hr.—Box 834, FOUNDRY TRADE JOURNAL, 49, Wellington Street, London, W.C.2.

FURNACES, PLANT, SUPPLIES.

Bale-out Furnaces; 200 lbs. aluminium capacity.
Tilting Furnaces; 500 lbs. aluminium capacity.
Tilting Furnaces; 150 lbs. aluminium capacity.
Two Light Alloy, Wild-Barfield, Heat Treatment Furnaces! 15 kw. fan, transformers and control panels and quenching tanks, baskets.
Six-chamber Pot Drier.
St. George's Shot Blast Cabinet; 10 by 10.
Two Shot Blast Hand Cabinets.
One Core Blowing Machine.
3-in., 6-in., 12-in., and 14-in. Universal Grinding Wheels.
All sizes Morgan Crucibles.
Mild Steel Magnesium Pots.
Assorted Refractory Bricks; all types of furnaces.

W. J. HOOKER, LTD.,
73, COTSWOLD GARDENS, N.W.2.

WANTED.—1- to 2-ton Steel Convertor —Write ARMFIELD, Morden Road, Mitcham.

WEIGHBRIDGES FOR SALE.

Secondhand, 60-ton, dial type, Tandem RAILWAY WEIGHBRIDGE, by Pooley; comprising two 16 ft. by 6 ft. Platforms, set 3 ft. apart, with sunken rails.
Secondhand, 30-ton, sliding weight type RAILWAY WEIGHBRIDGE, by Pooley; with Platform 14 ft. by 4 ft. 8½ in.
Secondhand, 20-ton, sliding weight type ROAD WEIGHBRIDGE, by Dennison; with Platform 16 ft. by 8 ft.
GEORGE COHEN, SONS & CO., LTD., WOOD LANE, LONDON, W.12, and STANNINGLEY, near LEEDS.

ONE Sand Mill; stationary pan 4 ft. dia.; two plain rolls 2 ft. dia.; 8 in. face; outlet slide in bottom; ball thrust centre spindle; bevel drive under; complete with 3 rope Vee drive; suitable for 7½ h.p. motor, 1,450 r.p.m.; price, £40.—JOHN JONES & SONS, LTD., Britannia Foundry, Loughborough.

THOS. W. WARD LTD.

LANCASHIRE BOILER; 30 ft. by 8 ft. by 120 lbs. w.p.
VERTICAL CROSS-TUBE BOILER; 7 ft. by 3 ft. by 80 lbs. w.p.
VERTICAL CROSS-TUBE BOILER; 12 ft. 10 in. by 4 ft. 6 in. by 80 lbs. w.p.
VERTICAL CROSS-TUBE BOILER; 7 ft. 4 in. by 3 ft. by 80 lbs. w.p.
VERTICAL CROSS-TUBE BOILER; 7 ft. 2 in. by 2 ft. 11 in. by 80 lbs. w.p.
VERTICAL CROSS-TUBE BOILER; 7 ft. by 2 ft. 9 in. by 80 lbs. w.p.
ECONOMIC BOILER; 12 ft. by 6 ft. 6 in. by 200 lbs. w.p.
PORTABLE BOILER and ENGINE; 30 h.h.p.; 120 lbs. w.p.
NEW TAR BOILERS; 15-, 25- and 40-gall. capacities; suitable for Contractors, Paviors, Builders, etc. Larger sizes quoted for.
LARGE AND VARIED STOCK GOOD SECONDHAND ROLLER STEEL JOISTS, ANGLES, CHANNELS, ROOF PRINCIPALS, ETC.
LOW PRICES. QUICK DELIVERY.
ALBION WORKS, SHEFFIELD.
'Grams: "Forward." 'Phone: 26311 (15 lines).

'Phone: 22877 SLOUGH

JACKMAN CUPOLA, as new, 4ft. 3in dia., £130.

Continuous Core Stove, as new, half the new price.

Plenty of new shot blast Machines.

Twenty Morgan Tilting Furnaces.

New A.C. Motors in stock:

ELECTROGENERATORS LTD.

Foundry Machinery Merchants

14 AUSTRALIA Rd., SLOUGH

BUY FROM US AND SAVE MONEY

HAND MOULDING MACHINES.

Farwell Type Plain Hand Squeezers.
"Utard" Type Hand Press Pin Lift; sizes AB2 and AB3, by Foundry Equipment.
Hand Squeeze Pin Lift; table 22½ in. by 14½ in.
Berkshire Hand Ram Pattern Draw.
Pridmore Hand, to admit 15½ in. by 15½ in.
Standard Size Adaptables (and large).
Sandblasting Plant; 50 Air Compressors; 500 Electric Motors, Dynamos, etc.

S. C. BILSBY,
CROSSWELLS ROAD, LANGLEY GREEN, NEAR BIRMINGHAM.
Broadwell 1359.

MISCELLANEOUS

PATTERNS for all branches of Engineering, for Hand or Machine Moulding.—FURMSTON AND LAWLOR, Letchworth.

GOOD CLASS IRON CASTINGS WANTED.—Printing Machine Manufacturers, promising many years' continuous business, approximate 2 to 4 tons per week, commencing almost immediately; chiefly bed castings, 16 cwts. each; if required also smaller castings; planing and milling can be given to foundry if desired; West Country foundry preferred, but not essential.—Box 822, FOUNDRY TRADE JOURNAL, 49, Wellington Street, London, W.C.2.

CAPACITY urgently required for high-class Grey Iron Castings, as used in electric motor construction, 1/250 b.h.p.—HUGH J. SCOTT & Co. (BELFAST), LTD., Volt Works, Belfast, N. Ireland.

IRON CASTINGS wanted—soft grey—for large Firm in Midlands; machine and light loose pattern work; weight from 2 lbs. to 1½ cwt.; state capacity and when deliveries could commence.—Box 233, 8, Serle Street, London, W.C.2.

NON-FERROUS FOUNDRY, capacity available, including sand blasting; competitive prices quoted.—ALBUTT, SON & JACKSON, Valve Makers and Brass Founders, Greenmount Works, Halifax.

LEATHER APRONS for the Foundry Trade—Made of best quality materials; various types available from 10s. each; 20-page catalogue of Aprons and other lines of industrial clothing and equipment sent post free on receipt of 3d. stamps.—WILLSON BROS., Epsom, Surrey.

REFRACTORY MATERIALS.—Moulding Sand, Ganister, Limestone, Core-Gum; competitive prices quoted.—HENDALL SAND CO., LTD., Silver Street, Halifax, Yorks.

LEATHER FINGER STALLS.—Made of chrome hide; very strong and hard wearing; length 3 in.; price 4s. per doz.; prompt delivery; sample on application.—WILLSON BROS., Industrial Clothing Manufacturers, Epsom, Surrey.

PATTERN MAKERS (ENG). CO., LTD. [Est. 1912
SHREWSBURY ROAD, WILLESDEN, LONDON, N.W.10
HIGH-CLASS PATTERNS and MODELS NON-FERROUS CASTINGS
ELGAR 8031/8032 (On Government Lists).

PLATE PATTERNS
WOOD and METAL for MACHINE or HAND MOULDING
LOOSE PATTERNS
UP TO HIGHEST DIMENSIONS
Finest Workmanship. High Technical Assistance for Easy Foundry Production
MOST MODERN SPECIALISED PLANT IN SOUTH ENGLAND
Keen Quotations Good Delivery
Send your Enquiries to
B. LEVY & CO.
OSBERT STREET, LONDON, S.W.1
Telephones: Victoria 1073 & Victoria 7486

T.W.S. ROBINSON & CO.
INDUSTRIAL CONSULTANTS
Undertake the re-organisation of industrial units from small departments to trade associations
47, Victoria St., S.W.1

LEADING FOUNDRIES USE
FULBOND
THE NEW FOUNDRY BONDING MATERIAL
manufactured by
The Fullers' Earth Union Ltd.,
Telephone: REDHILL 2153
REDHILL 731 (*Technical Enquiries*)
Redhill, Surrey

BALDWIN

INSTRUMENT COMPANY LIMITED

Laboratory methods of determination requiring time and skill can often be replaced by direct-reading instruments that can be successfully used by the non-technical worker. Our development service for industry covers the field of Idea, Prototype and Manufacture. Ask us about it.

SIMPLIFIED MEASUREMENT AND CONTROL

★ BALDWIN INSTRUMENT COMPANY LIMITED
CUMNOR · OXFORD
Originators and makers of scientific instruments for measurement and control.

B 2

PATTERNS WITH MODERN FOUNDRY TECHNIQUE

Consult:
THE UNIVERSAL PATTERN CO.
269, ROTHERHITHE NEW ROAD,
BERMONDSEY, S.E.16
Tel: BER. 2590.

SANDBLASTING!!!

YOUR COMPONENTS COLLECTED AND DELIVERED By 24 HOUR SERVICE

The WALSALL SANDBLASTING Co. LTD
BLUE LANE WEST · WALSALL *Phone: WALSALL* 5708

PATTERNS

WOOD AND METAL

G. PERRY & SONS
THORNTON LANE,
LEICESTER
Over 100 Skilled Craftsmen at your service.

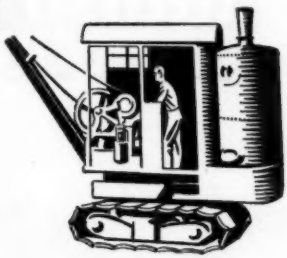
GROUND GANISTER

STEEL MOULDERS COMPOSITION

SILICA BRICKS · CHROME BRICKS · MAGNESITE BRICKS
CHROME-MAGNESITE BRICKS
SILLIMANITE BRICKS

PICKFORD, HOLLAND & Co. LTD., SHEFFIELD.

The better use of POWER



Where to look for further economies

YOU MAY HAVE DECIDED that you have reached the limit of improvement in efficiency of power usage. But are you sure? Why not make doubly sure by going through these Bulletins *point by point?* If your search reveals only a single possibility it will have been well worth while. The probability is that you will find many.

Turn up these Bulletins:

FUEL ECONOMY BY SAVING ELECTRICITY
(*Bulletin No.* 13)

A rapid survey of the possibilities. Brief, practical pointers that take you straight to sources of substantial economy in electricity consumption.

THE INDUSTRIAL USE OF COMPRESSED AIR
(*Bulletin No.* 29)

Compressed air is a very convenient medium of power transmission. But it can also be a great waster of power unless carefully supervised and maintained. This Bulletin tells you what to look for and how to put it right.

FUEL ECONOMY AT COLLIERIES
(*Bulletin No.* 32)

The colliery official will find this Bulletin a real boon. It is a guide to the economical operation of colliery compressed air plant, but it also contains a brief summary of hints on steam boilers, prime movers, fans, pumps and so on.

SMALL VERTICAL BOILERS, STEAM CRANES AND SHUNTING ENGINES (*Bulletin No.* 37)

These power units are often neglected. How fuel losses can be reduced and operation improved is explained in a very practical way.

UNTIL YOU HAVE looked into the possibilities of every recommendation in these Bulletins you ought not to decide that your power is being used efficiently. If you haven't all the Bulletins ready at hand, please ask for the copies you need from the Regional Office of the Ministry of Fuel and Power.

ISSUED BY THE MINISTRY OF FUEL AND POWER

Ransomes Electric TRUCKS

1.2.4 TONNERS

Let us know your transport lifting or stacking problem and we can probably provide the answer. The versatility of Ransomes Electric Trucks is second only to their economy and efficiency.

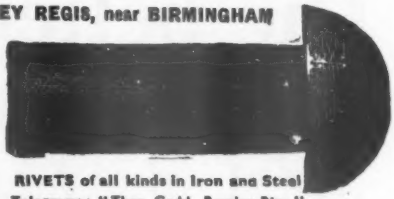
The illustration is of the famous 2-tonner

A TYPE FOR EVERY TYPE OF JOB

Ransomes Electric Trucks are available in a wide range of models to meet all requirements. There are 1-ton, 2-ton and 4-ton trucks with fixed or elevating platforms, tiering trucks, fork trucks, crane trucks, tipping trucks, tractors, etc. Catalogues and prices will be sent on application to Dept. F.T.J.

RANSOMES SIMS & JEFFERIES LTD
PRECISION MECHANICAL AND ELECTRICAL ENGINEERING · IPSWICH
THE COMPANY'S WORKS COVER 40 ACRES.

THOS. GADD, ROSS BOLT, NUT and RIVET WORKS,
ROWLEY REGIS, near BIRMINGHAM



RIVETS of all kinds in Iron and Steel
Telegrams: "Thos. Gadd, Rowley Rise."
Telephone: Blackheath 1020. Established 1830.

KING Bros.
(Stourbridge), Ltd., STOURBRIDGE, England
Telegrams: "KING BROS., STOURBRIDGE."

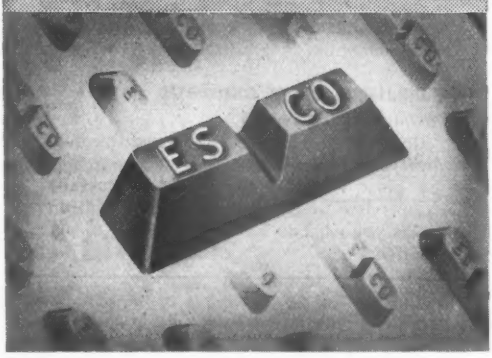
STOURBRIDGE CLAY.

THE HIGHEST AWARDS for GAS RETORTS and other goods (in Fire Clay) have been awarded to KING BROTHERS for their goods made from their renowned STOURBRIDGE FIRE CLAY.

Manufacturers of CUPOLA BRICKS, Best QUALITY. Lessees of *DELPH* and *TINTERN ABBEY BLACK* and *WHITE CLAY. BRICKS FOR REGENERATIVE SETTINGS. BLAST FURNACE LININGS. COWPER* and other *HOT AIR STOVE BRICKS.*

Coke Oven Bricks a speciality.

GUN METAL



Phosphor Bronze
"Tandem" White Metal Alloys
"Eyre" Aluminium and Aluminium Alloys

EYRE

Gun Metal Ingots
Bearings for all purposes
Chill Cast Phosphor Bronze Rods

SMELTING COMPANY LIMITED
TANDEM WORKS, MERTON ABBEY, S.W.19
Telephone: MITCHAM 2031 (4 lines)

4101

ROWLAND

Typical Performance on 2 in. Aluminium Bronze risers 150/200 cuts per wheel. Cutting time 10 seconds each.

FOUNDRY TYPE ABRASIVE WHEEL CUTTING OFF MACHINE FOR NON-FERROUS & MEEHANITE CASTINGS.

Designed for the speedy and easy cutting of risers and gates up to 3 in. diameter. Sturdy construction throughout with ample power for severe duty. Wheel head swings to any angle : a useful feature for light castings too large for the table. Alternative operational methods available as follows :—

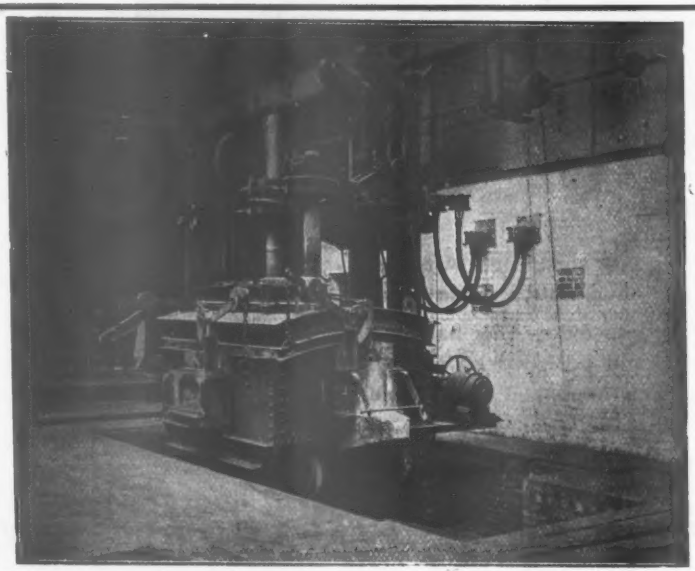
- Lock head and pull wheel down by hand.
- Lock head and wheel and push work through.
- Swing head clear, lock head and wheel and cut off free hand.

WRITE FOR FULL PARTICULARS

Duplex tables will simplify the holding of awkward castings.

F. E. ROWLAND & CO. LTD. REDDISH Near STOCKPORT

Refined Cold Blast
PIG IRON
REFINED PIG IRON FOR MOTOR CYLINDERS • CHILLED IRONS FOR CHILLED CASTINGS • REFINED HEMATITES FOR MALLEABLE CASTINGS
IN 15 TON CASTS DIRECT FROM RECEIVER TO REQUIRED ANALYSIS
Castings made from these irons have greater density and toughness. You will have fewer rejections—greater freedom from cracks, breaks and other defects.
SPECIAL NICKEL & CHROME ALLOYS
Hand Samples on Request—
WEST MIDLAND REFINING CO., LTD.
DIRECTORS: ING. R. FOSSER, CHAS. B. PUGH
Registered Office: LLOYDS BANK CHAMBERS, WALSALL Telephone 2131
Works: MILLFIELDS ROAD, BILSTON Telephone 21059



GREAVES-ETCHELLS
ELECTRIC STEEL FURNACES

More than 100 Furnaces supplied during last 7 years

WATSON ROTATING ELECTRIC FURNACES Ensure
RAPID & CLEAN MELTING
THOROUGH MIXING
NON-FERROUS METAL MELTING
ELECTRIC FURNACES
Single, Two, or Three Phase

Contractors to Home and Foreign Governments

WATSONS
(METALLURGISTS)
LIMITED
Pulvometal Works, Mill Lane, DRONFIELD

KING

SAFETY LIMIT SWITCH AT TOP & BOTTOM POSITION

ALL ELECTRIC PENDANT PUSH BUTTON CONTROL

● ELECTRIC

CHAIN PULLEY BLOCK

Write for Booklet on Lifting and Shifting or separate Catalogue of Conveyors, Cranes and other Mechanical Handling Equipment

GEO. W. KING LTD.

HARTFORD WORKS, HITCHIN, HERTS.

Phone: HITCHIN 960 (10 lines)

L. H. & S.

FURNACES for MELTING

For all metals, and all fuels.

Illustration shows hand tilting furnace easy balanced pouring up to 200lbs. cap.

AGENTS WANTED FOR COLONIES AND CONTINENT.

England's Leading Furnace Makers.

LEES HALL & SONS LTD.,

Regd. Office—**113, WHITEHOUSE COMMON ROAD, SUTTON COLDFIELD.** *Tel.: Sut. 3749.*

No. 2, Furnace Works, Floodgate St., Birmingham, 5
Tel.: Mid. 5854

ETHER
MOLTEN METAL
PYROMETERS

USED BY FOUNDRYMEN ALL OVER THE WORLD AND ACKNOWLEDGED BY THE LEADING METALLURGISTS TO BE THE MOST ACCURATE MOLTEN METAL PYROMETER

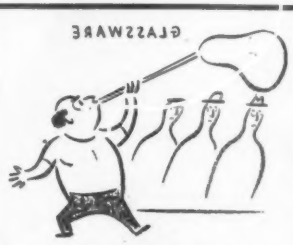
ETHER LTD.
TYBURN ROAD · ERDINGTON · BIRMINGHAM · 24
TELEPHONE EAST 0276

SEND FOR OUR DESCRIPTIVE LEAFLET No. 437

CASTINGS
FOR ENGINEERS
MOTOR TRADES
&c.
Castings Sand-Blasted

"STAR FOUNDRY"
Birmingham Street,
WILLENHALL, STAFFS.
Telephone:
351/2 WILLENHALL.
Telegrams:
"STAR FOUNDRY,
WILLENHALL."

WILLIAM HARPER,
SON & Co. (WILLENHALL) Ltd.
Malleable and Soft Grey Ironfounders



What's he up to now?

GLASS
OF ALL KINDS

BUTTERWORTH
BROS. LTD.
Newton Heath,
MANCHESTER

BLACKING

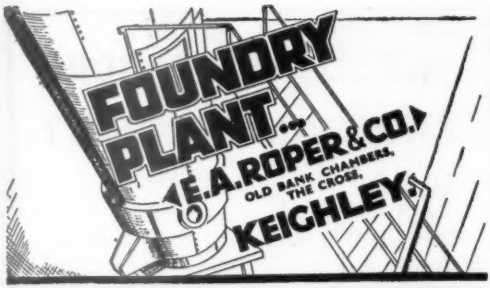
PLUMBAGO
CORE GUM
CORE COMPOUNDS
PARTING POWDERS

WM CUMMING & CO. LTD

WORKS AT
GLASGOW • FALKIRK • CHESTERFIELD
DEEPFIELDS Nr. BILSTON & MIDDLESBROUGH

FURNACES
MOULDING MACHINES
SAND MIXERS
ELECTRIC RIDDLES

COAL DUST



DEPENDABILITY
IN GREAT OR SMALL
IS
ESSENTIAL.
CHAPLETS are the SMALL
things in the FOUNDRY
but the BEST are NEEDED.
WARING BROS.
QUALITY **IS** DEPENDABLE
TEST THEM
Write—DOCK WORKS, BARNSLEY

USE
"ANGLOY"
BRAND TUNGSTEN CARBIDE
SAND BLAST NOZZLES
500 times longer life than chilled iron!
ANGLARDIA LTD.
ADELPHI IRONWORKS, SALFORD, 3

An accepted replacement for up to 50% of Linseed Oil in CORE COMPOUNDS

EDMOR REGD.
Petroleum Extracts

The shortages of the War years have established Edmor Petroleum Extracts as completely satisfactory extenders of Linseed Oil, with

(*a*) **no loss in tensile strength of sand mixes.**

(*b*) **no adverse effect on stripping qualities.**

Two great advantages to users are: first, the *immediate* availability of these Petroleum Extracts; and secondly, the saving of approximately 30% in cost as compared with Linseed Oil.

From the national point of view the advantages are: first, the saving in shipping (since the Petroleum Extracts are available within the country), and secondly, the saving in currency exports.

Write to Dept. G.2 for Samples and Technical Literature.

PETROMOR LTD
St. James's Buildings, 89, Oxford Street, Manchester, 1.

An associated company of Manchester Oil Refinery, Ltd.

No. 10 PREPARED BLACKING

The Core and Mould Wash *for* IRON CASTINGS

●

ALUMISH* for *Aluminium Castings

STEELMOL* for *Steel and Special Iron Castings

High Carbon Blacking

Ceylon Plumbago · Terra Flake

Coal Dust · Ganister & all Foundry Supplies

James Durrans & Sons Ltd.

Phoenix Works & Plumpton Mills
Penistone, near Sheffield

Tel.—Penistone 21 & 57
'Grams—Blacking-Penistone

THE STAVELEY COAL AND IRON COMPANY LIMITED

announce that, as from the 31st December, 1945, Messrs. Edmonds, Sims and Company will no longer act as their selling agents for pig iron in the Birmingham district, and from the 1st January, 1946, their interests will be looked after by Mr. C. R. Muras who has joined the staff of The Staveley Coal and Iron Company Limited. Mr. Muras will operate from The Staveley Coal and Iron Company's Offices, York House, Great Charles Street, Birmingham, 3

HENRY BUTCHER & CO.

Specialist Auctioneers and Valuers of Factories, Plant and Machinery

All Certificates of Value are accompanied by a detailed inventory with every item separately priced

Fire Loss Assessors

73, Chancery Lane, London, W.C.2.

Telephone:
HOLborn 8411 (8 lines)

GOOD LIGHTING IS A TONIC
ESPECIALLY WITH OSRAM
A new era of brightness in the home, office and factory! Brightness, cheerfulness, cleanliness, fresh air, good health and good lighting are the order of the day. Good lighting is a tonic—especially with Osram!
Osram
THE WONDERFUL LAMP
A G.E.C. PRODUCT

Advt. of The General Electric Co. Ltd., Magnet House, Kingsway, London, W.C.2

SAND AND LOAM MILLS

WITH STATIONARY SELF DELIVERING PAN AND ELECTRIC MOTOR DRIVE

SIZES FROM 3' 6" dia. to 6' 0" dia.

EASTON & JOHNSON LTD., *Engineers*, TAUNTON

PHONE 3146

SKLENAR FURNACES

Capacity 320 lbs. to 5 tons

OIL, COKE OR GAS FIRED

For Economic & Rapid Melting of Non-Ferrous Metals

SKLENAR PATENT MELTING FURNACES LTD.

East Moors Road, CARDIFF.

FOUNDRY PRACTICE

is sent *free on request* to any foundryman. It is to help the practical man overcome his difficulties.

The following articles appeared in recent numbers of "Foundry Practice":

Test Bars	FP.66-70, 75, 77	Manganese Bronze Moulding and Casting	FP.75
High Duty Cast Iron	FP.72	Lining of Bearing Shells	FP.75
Burning of Castings	FP.73-74, 76	Mould Coatings	FP.76
Feeding of Castings	FP.74	The Casting of Magnesium	FP.77
High Conductivity Copper	FP.75		

Applicants will be put on the mailing list and posted back numbers, if still in print. Write to :—

FOUNDRY SERVICES LIMITE 285/7 LONG ACRE NECHELLS BIRMINGHAM 7

Revolving or Stationary **PANS** Batch or Continuous treatment, Over or under-driven.

MILLS & FOUNDRY MIXERS

For **CORE SANDS**

KNOWN THE WORLD OVER

Smedley

TRADE MARK

for **LOAM** or **GANISTER**

Capacities:- **BATCH MILL**, 1 to 20 cwts per charge. **CONTINUOUS MILL**, 5 to 40 tons per hour. Belt or Electric-Motor Driven.

Smedley Brothers, Ltd., Belper. Derbyshire. England.

'GRAMS: SMEDLEYS, BELPER' 'PHONE: BELPER 12.'

For **FACING SANDS**

Serving the World of To-day

AND TO-MORROW !

Industrial equipment of outstanding merit has always been associated with the name **Alfred Allen & Son Ltd.** Progressive development linked with consistently high standards of workmanship have paved the way to ever-advancing achievement.

Barrows. Trucks. Trolleys. Skips. Waggons. Trailers. Stillages. Conveyor Buckets and Baskets.

Alfred Allen

AND SON LIMITED

LOWER GORNAL, Nr. DUDLEY

Telephone: Dudley 2460 & 2469

London Office: 23 Lawrence Lane, E.C.2. Telephone: Monarch 4718

RESEARCH SUPPORTS PRODUCTION

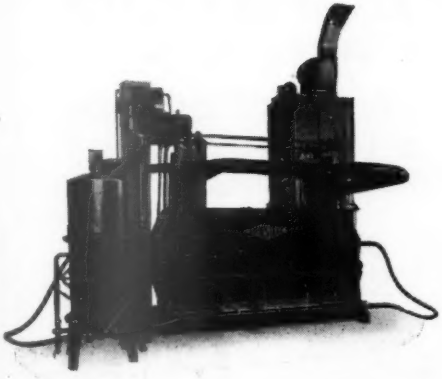
To the exacting work of rebuilding everywhere we shall need to bring all the more important war-tested developments that have helped to defeat the enemy. Many branches of building and engineering can start now to benefit — for aluminium and its alloys are already available in abundance, to raise the level of production.

ALUMINIUM UNION LIMITED

A fully-owned subsidiary of Aluminium Limited, Montreal, Canada

GROSVENOR HOUSE, PARK LANE, LONDON, W.1

SHOT BLAST FEATURES SPENSTEAD **No. 8**



WHAT'S YOURS?...

We know the usual answer, but we would also like to know your particular problem in shot blasting; it might prove easier to solve? The plant illustrated is for blasting the interior and exterior of large cylindrical vessels. Something of the same nature can be used for Roll Chills.

★ *But whatever the job, there could be a Spenstead plant for the purpose.*

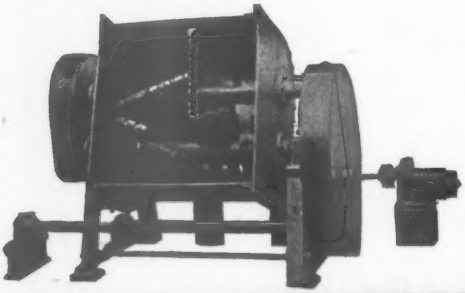
SPENCER & HALSTEAD LTD OSSETT · YORKS PHONE OSSETT 353

LONDON: 60 BERNERS ST., W.1. RUGBY: 17 LAWFORD ROAD. GLASGOW: 61 ST. ENOCH SQUARE, C.1.

DO all mixers really mix?

. . . or is it just a glorified stir? For real mixing means the bringing of the various ingredients into a true homogeneous batch, with the proportions of the materials correctly maintained throughout. Comparison of ordinary mixer blades of fanciful shapes with the scientifically designed intermeshing blades of the Beken Duplex Mixer explains the difference. The work is done between the blades of the Beken Duplex Mixer and *not* between the blades and the pan . . .

A foundryman writes: "I am pleased to state I am convinced the Beken Duplex machine is very suitable for mixing oil sand. The results prove that the mixing action is very thorough."



BEKEN DUPLEX MIXERS do

Sole Distributors: LAVINO (LONDON) LTD. 103 KINGSWAY, LONDON, W.C.2

Sole Makers: E. HUNT & CO., LTD. RIPPLE ROAD, BARKING, ESSEX

Telephone: Chancery 6713 (3 lines)

ABRASIVE WHEELS

for High and Normal Speeds . . .

HIGH SPEED ELECTRICALLY DRIVEN DRY GRINDERS

IN STANDARD SIZES

WET and DRY GRINDERS
TOOL GRINDERS etc.

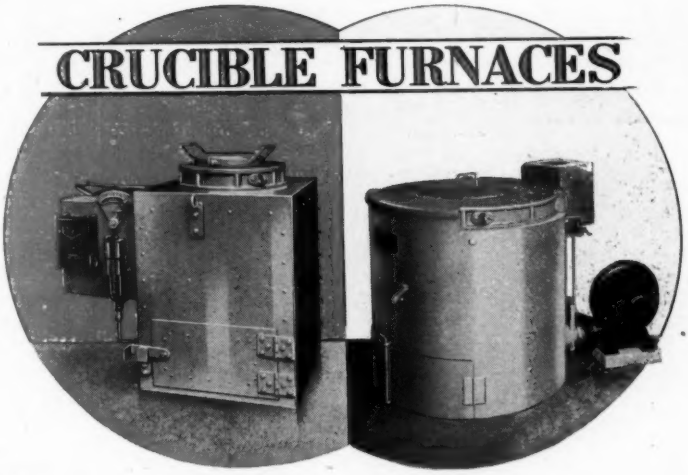
LUKE & SPENCER, LTD.

BROADHEATH **ALTRINCHAM**

Telephone: Altrincham 3281-3282 *Telegrams: Emery, Altrincham.* *Code: ABC, 5th & 6th Editions*

Published by the Proprietors, INDUSTRIAL NEWSPAPERS, LIMITED, 49, Wellington Street, Strand, London, W.C.2, and Printed in Great Britain by HARRISON & SONS, LTD., 44/47, St. Martin's Lane, London, W.C.2

CRUCIBLE FURNACES



Two new coke-fired furnaces

Designed to bring out to the full the well-known advantages of crucible melting, these two modern furnaces give fast and efficient melting and reduce capital and running costs to a minimum.

They are simple to instal, compact and self-contained, clean and comfortable to work.

The portable lift-out furnace is made in four sizes—50, 120, 200 and 300 lbs. (brass) capacity — and is suitable for ferrous and non-ferrous work.

The bale-out is made in four sizes—100, 200, 300 and 400 lbs. (aluminium) capacity — and is suitable for aluminium and zinc alloys.

These and other new Morgan furnaces can be seen at work when desired and are shown in pamphlet M.F.1., sent on request

A **MORGAN** product

THE MORGAN CRUCIBLE COMPANY, LTD., LONDON, S.W.11

FOUNDRY TRADE JOURNAL

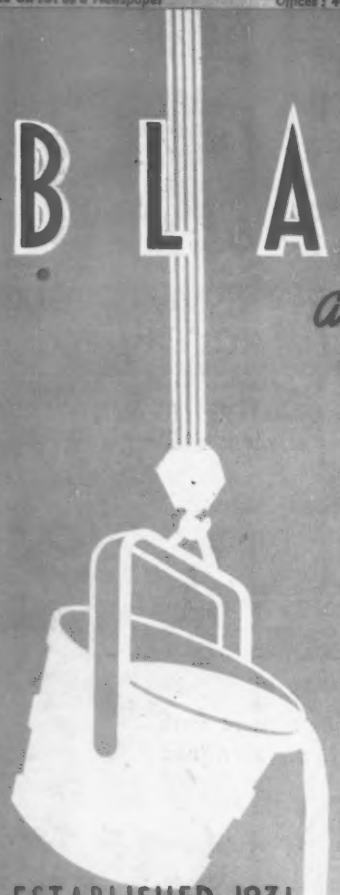
EST. 1902

VOL. 77. No. 1532.
Registered at the G.P.O. as a Newspaper

WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL
DECEMBER 27, 1945
Offices: 49, Wellington Street, Strand, London, W.C.2

[Single Copy, 6d. By Post, 8d. Annual Subscription Home and Overseas, 21/-

BLACKING
and all Foundry Requisites



COAL DUST, CHARCOAL
PLUMBAGO, BLACKLEAD
CORE GUMS, "COREITE"
LIQUID CORE BINDER
Plumbago Facings

ESTABLISHED 1831

ISAAC & ISRAEL WALKER
EFFINGHAM MILLS · ROTHERHAM
CONTRACTORS TO WAR OFFICE AND ADMIRALTY.
Telephone:- ROTHERHAM 33 Telegrams:-WALKERS, ROTHERHAM.